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* *Note to Binder.*—These are to be bound to follow the last number in the volume of the JOURNAL OF TROPICAL MEDICINE AND HYGIENE.

Original Communications.

THE RECENT CHOLERA EPIDEMIC IN BANGKOK, SIAM.

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AND

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Assistant M.O.H.

HISTORICAL.

IT is impossible to state with exactness when cholera first appeared in the city of Bangkok. The first deaths were reported in the early part of 1919, but it is reasonable to believe, from the following short history of its first appearance in the interior of Siam and its rapid approach to the capital, that the disease was with us quite some time before recorded.

From the health authorities of the Ministry of the Interior we are informed that the first cases occurred in the city of Tak, February 26, 1918, presumably coming from Burma. It spread rapidly down the river Chao Phya and reached the old capital, Authia, on April 4. From Authia it proceeded unabated towards Bangkok and is reported as being epidemic in Pradum and Udaihani on April 22 and 24, both towns near Bangkok. In the latter part of April and the beginning of May it is also reported as being epidemic in widely separated provinces, including some of the Southern and Eastern Circles.

Cholera is also reported as being epidemic in China in the early part of 1919, having been introduced into the city of Swatow from the Philippines and spreading from that point to the north and south. Regarding the presence of the disease there is no doubt, but as regards the correctness of the time of its initial appearance there is considerable doubt, and it is possible and even probable that cholera was epidemic, certainly endemic in China, in the early part of 1918, and spreading to the south entered Burma and then Siam. The disease, not reported, probably passed through the upper part of French Indo-China and thus also gained entry into the country.

In this paper we are not so much interested as to the exact time of the beginning of the epidemic, or where it actually originated, as we are in the lessons to be learned from the epidemic itself. We view it unbiased and entertain no theories that we wish to prove.

Regarding the bacteriology, the pathology, and the clinical manifestations of the disease, we have nothing new to offer. Our interest lies mainly in the prevention, the method one should adopt, the methods, under local conditions, one could adopt, and the results obtained. This in turn will lead us to a short discussion regarding the vital statistics of the epidemic, and we wish to make some few remarks with reference to the results obtained by locally trained Siamese doctors, in the use of Rogers' treatment.

PREVENTION.

Let us first briefly describe the local conditions

and see what we have to contend with under ordinary circumstances.

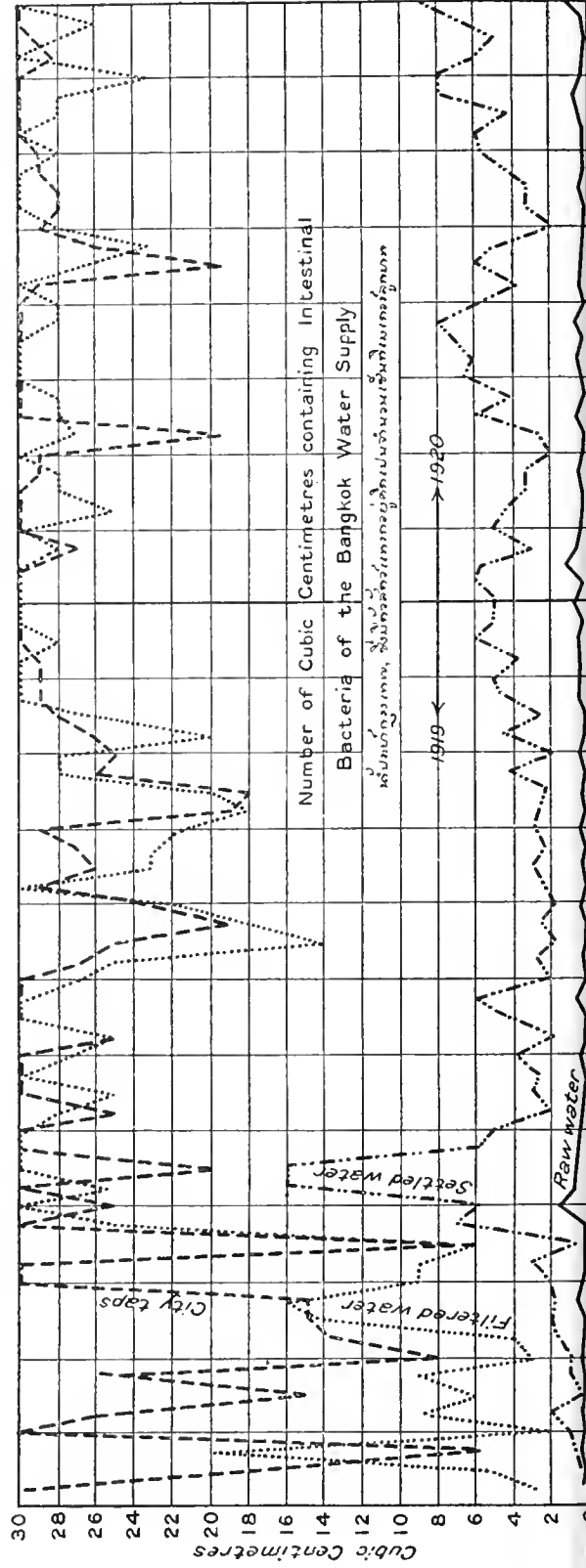
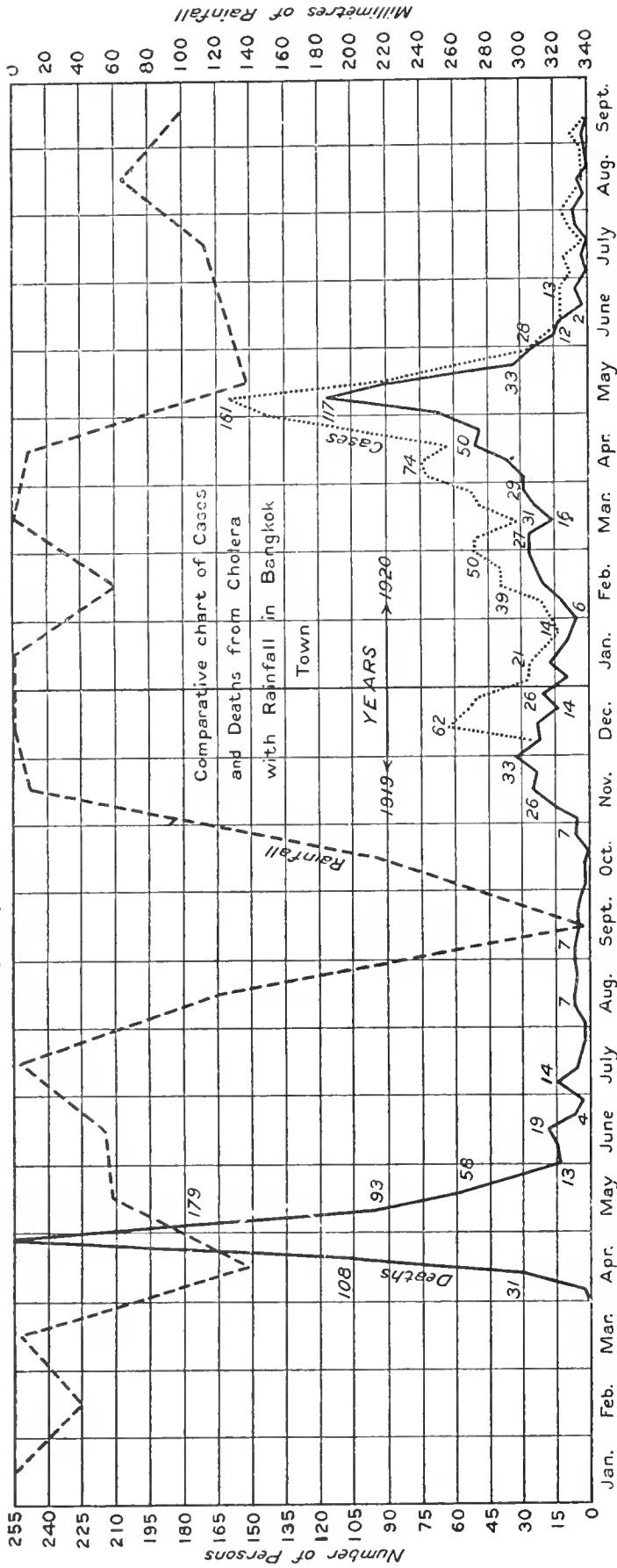
Bangkok is a city with a population of 540,679, census of 1910-1911. This is probably a low estimate, as a result of the methods used in the enumeration and the numerous difficulties encountered in collecting the figures. From the data of recorded births and deaths it would appear that the natural increase of the population is 11 per thousand; this would give a corrected population of 675,736 for 1920. This population is made up of Siamese, Chinese, Indians, Malays and Europeans and other nationalities in the frequency of numbers in the order mentioned. The exact proportions are not available, but at least 80 per cent. are composed of Siamese and Chinese, while the European population is about 1,500. Regarding the standard of intelligence it is safe to state that not more than 33 per cent. are literate.

The city proper is located on both sides of the river Menam Chao Phya, by far the greater portion lying on the east side, which is also the most modern and up to date. Bangkok is about 30 miles upstream from the bar as one follows the river, but not more than 15 miles as the "crow flies." It is situated at the end of an alluvial plain, there is no high ground, neither are there any valleys or depressions in its vicinity. The character of the soil is as follows: There is about 1 metre of firm clayey soil resting on 8 to 10 metres of black, muddy, waterlogged clay, which in turn rests upon a thick layer, 20 to 30 metres, of firm yellow clay. The level of the ground water is always high.

In November of 1914 the new water works system was completed, and supplies the city on the east side of the river with a good domestic water. It was necessary in order to secure a supply not affected by the sea, the river being a tidal river, to tap the Menam Chao Phya some 30 kilometres above the city and conduct the water through a private canal to the filters. The said filters are of the Jewel type and have a daily capacity of 26,000 cubic metres. As stated above, the east side of the city only is supplied with this water; the west side, consisting of some 72,610 people, derives its supply of water from the many canals that intersect with each other and from collected rain-water, &c.

Although the city proper is supplied from a modern plant we find in one of the most congested portions, "China Town," a private installation furnishing the people with a water pumped directly from the river and receiving practically no treatment. Why is this not prohibited? To relate all of the reasons why this is not prohibited would be a great waste of time; suffice it to state that it cannot be done, due to vested interests. But supposing it could be done, what then? You will find to-day thousands of people who much prefer the canal water to the pure supply furnished by the city. They say the water from the canals has taste, colour, and body to it, while the city supply is too weak!

Regarding the disposal of night-soil the present state of affairs is quite unsatisfactory. A water carriage system is possible, but prohibitive in cost, due to the local topography. In the past and at present the bucket system is used, and as a result of the



multiplicity of the contractors and the lack of authority on the part of the M.O.H., it is impossible to imagine this particular system producing worse results. It is an ill wind that blows nobody good, and as a result of the havoc played by the recent cholera epidemic it is probable that a material improvement with regard to the removal of night-soil will be made.

Very briefly we have discussed the two important public health safeguards—the water supply and the disposal of night-soil. Other local conditions are not unlike those found in any Far Eastern city. It is of utmost importance for the reader to keep the following points in mind while he subconsciously criticizes the authors for what seems to be a lack of initiative on their part in an attempt to control an epidemic. Although the office of the M.O.H. has been in existence for over twenty years, the budget for expenses has not been materially changed during that time, and during the last ten years has remained practically stationary. There are laws sufficient to control almost any kind of an epidemic, but power to enforce them is very grudgingly doled out. Also the foreign population, business and otherwise, paying no taxes, is not in a position to demand the expenditure of revenue upon public health measures.

Looking at all these things from a more liberal point of view, as opposed to an arbitrary and strictly sanitary and public health viewpoint, it is not at all surprising to find conditions such as they are. We do not seem to be able to recall at the present time the inauguration of any important public health measure either in America or England that did not meet with considerable opposition, and that from a people who are supposed to be the most enlightened in the present day and age. The measures were, as a rule, usually adopted in spite of the layman's protest, for the simple reason the Government did not consider the layman's point of view as worthy of serious consideration. It is not to be expected that Western methods of disease prevention are going to be acclaimed by the layman of the Far East as an unalloyed joy, especially when such measures seriously interfere with his accustomed everyday life and his deep-rooted religious principles. Although Siam is an absolute monarchy, the impression must not be gained that the people are without power. Public opinion is carefully considered and carries great influence.

THE METHODS ONE SHOULD ADOPT.

Castellani and Chalmers in their latest edition outline the following scheme:—

Public prophylaxis:—

- (1) Protection of frontiers by inspection posts and quarantine stations.
- (2) Central cholera board with full staff and apparatus for bacteriological and hospital work.
- (3) Instruction of the populace by means of pamphlets.
- (4) House-to-house search for cases.
- (5) Search for carriers and sources of infection.
- (6) Distribution of medicines and disinfectants.
- (7) Provision of medical aid which can be readily obtained by anyone.

(8) Crusade against house-flies.

Private prophylaxis:—

- (1) Personal cleanliness.
- (2) Avoidance of foods that are liable to cause diarrhœa or to be contaminated.
- (3) Avoidance of pollution of foods, especially by flies.
- (4) Filtration and boiling of all water used for cooking, drinking, &c. Filters to be kept strictly clean.
- (5) Boiling of milk and protection against flies.
- (6) Clean sanitary dwellings, free from flies.
- (7) Anti-cholera vaccination, repeated yearly in endemic centres.
- (8) Immediate application for medical aid in case of diarrhœal illness of any kind.

Obviously such a scheme with proper authority to make it effective is ideal, but let us, instead of considering a scheme that could not be applied, consider a few items under the following heading:—

THE METHODS, UNDER LOCAL CONDITIONS, ONE COULD ADOPT.

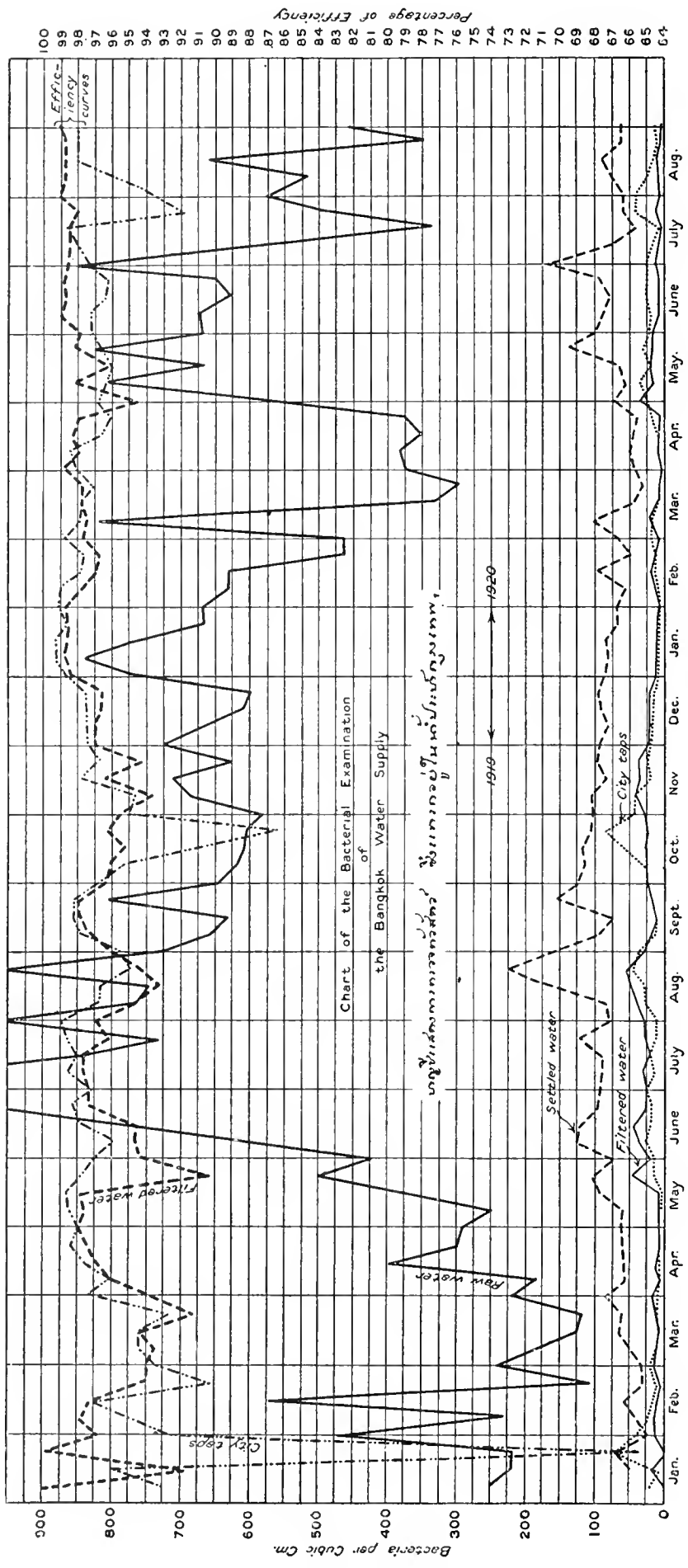
Under the head of public prophylaxis we may say that protection of frontiers by inspection posts and quarantine stations is a difficult problem. Maritime quarantine was more or less effectively carried out, but land quarantine was quite impossible under local conditions unless one had an unlimited staff, but our staff was extremely limited.

A central cholera board was out of the question, and hospital facilities consisted of one very small isolation hospital, the infectious disease hospital, built many years ago to take care of all acute infectious diseases, quite limited as to capacity and facilities for caring for an epidemic of whatever nature. Furthermore it is quite impossible to compel a patient, sick with cholera, to go to the hospital; he may, if he so desires, remain in his own dwelling. The bacteriological work was done in the regular laboratory of the M.O.H. It was limited in scope, due to limited funds, material and staff; this with special reference to the preparation of vaccine.

Regarding the instruction of the populace with pamphlets this was faithfully carried out. Handbills printed in different languages were widely distributed and hundreds of large, permanent signboards were posted throughout the city telling in the very simplest words the usual precautions to be taken.

House-to-house search for cases and a search for carriers and sources of infection was not possible.

Medical aid and the distribution of medicines was carried out with more or less success. As to the distribution of disinfectants, it was carried out in the following manner. From the time we were able to enforce the notification of all cases, spot maps were used to keep all cases reported under control. As soon as a new case was discovered or reported an inspector took charge, at once visited the house, carefully instructed the people with regard to the usual personal prophylactic measures to be adopted,



Percentage of Efficiency

Bacteria per Cubic Cm.

and the care of the patient. If possible the patient was removed to the hospital, but this succession usually met with an absolute and final refusal. The case was carefully watched, and after recovery or death the house cleansed, disinfected, and its flag removed from the spot map.

A crusade against flies in Bangkok produces the same results that a crusade against the high cost of living does in other countries. Certain it is that flies are not over abundant here.

As to personal prophylaxis it is a waste of time to enter into a discussion. It is not practised and there is no law to force the people to apply even the most elementary principles. As to anti-cholera vaccination it was impossible to obtain a one-dose vaccine and although you may be able to induce the people to submit to one injection you cannot find them with a search warrant to administer the second dose of a two-dose vaccine.

We do not, of course, hesitate to admit that the course of this epidemic, up to date, was in no way, shape or manner, influenced by the activities of the office of the M.O.H. But in justice to that office we plead extenuating circumstances, and in view of the fact that financially the office was more than embarrassed, that authority to enforce existing regulations was very difficult to obtain, combined with the ignorance and objections on the part of the people regarding modern disease prevention methods, we feel justified in pleading "Not Guilty."

STATISTICS.

Let us now briefly consider some of the figures and see what relationship local conditions, such as the water-supply, rainfall, the use of night-soil as fertilizer, had to the epidemic.

In referring to the morbidity and mortality graph attention is called to the fact that cases were not reported until December 6, 1919, although deaths were reported at the beginning of the epidemic as a result of a regulation making reportable all deaths from acute infectious disease in order to obtain a burial permit.

The following table consists of data obtained during the period of reportable deaths and cases.

CHOLERA IN BANGKOK.

December 7, 1919—September 30, 1920.

East side of river with pure water supply.

Pop.	Cases	Morbid	Deaths	Case Mort.	Ab. Mort.
603,126	829	1,376	483	58.26%	0.800
		per 1,000			per 1,000

West side of river with no pure water supply.

Pop.	Cases	Morbid	Deaths	Case Mort.	Ab. Mort.
72,610	684	942	360	52.63%	4.958
		per 1,000			per 1,000

Total.

Pop.	Cases	Morbid	Deaths	Case Mort.	Ab. Mort.
675,736	1,513	2,239	843	55.71%	1.247
		per 1,000			per 1,000

The above table speaks for itself and beautifully illustrates the effect of a pure water supply on an otherwise uncontrolled cholera epidemic. It is with great pleasure that we are able to state that the Government has now granted funds for the extension of the water to the west side of the river.

At first glance at the rain-graph as compared with the morbidity graph one is apt to come to the conclusion that instead of having a beneficial effect on the epidemic it added fuel to the fire. Now as a matter of fact that is just what did take place, but the effect was temporary and due to the flooding of the canals with surface infection. The rains were always followed by this increase and decline. At the beginning of 1919 we had a new infection on a virgin soil, the season was and had been very dry, the epidemic spread rapidly and there was at that time no law making cases reportable. The epidemic gradually increased, infection being carried by water and food, especially green vegetables sold in the public markets, the same having been manured with night-soil, and reached a high point just after the April rains, because the streams were polluted. As a result of the rains there is no need of artificial irrigation, the gardens have been manured and washed off and the entire surface infection flooded into the streams. The cases drop. The cases remain low until the beginning of November when, owing to a lack of rain, artificial irrigation and manuring of the fields was resorted to, and the disease was probably mostly food-spread during that time. After the soil had again become thoroughly contaminated along comes the rain in February, 1920, and again everything is washed off into the canals, causing an increase that lasted until May, when the rainfall was sufficient to flood off the land and continued to keep it flooded, as the graph shows. Whether or not the epidemic will now have died out or whether we are to keep up this vicious circle is to be seen.

In viewing the bacteriological graph it will be seen that the efficiency of the taps was not always up to standard, but this was always found to be a local affair with the tap examined, and in no way the result of the filters. It may be stated that one of us constantly examined the tap water for signs of infection and that at no time were cholera or cholera-like organisms found. On the other hand the canal water, during the acute phases of the epidemic, gave us positive results, but not during the very low periods, which would tend to add weight to the fact that during the low phases and previous to the heavy rains food played a most important part in the spread of disease.

Regarding the use of Rogers' treatment, compared to other more or less symptomatic treatments, the following table speaks for itself. It must be borne in mind that the treatment as administered was not controlled by blood-pressure examinations or taking the specific gravity of the blood. Locally trained men administered the treatment, and considering the fact that practically all of the cases in the hospital were of the most severe type, the results were not bad. Out of a total of 1,513 cases we were only able to induce 134 to go to the hospital and these of the worst type.

Treatment	Cured	Died	Recovered per cent.
Kaolin with water	11	10	0.32
Kaolin with "cholera mixture" ...	23	23	0.50
Rogers' treatment, not controlled ...	39	28	0.58

In certain public institutions in which the food and water supply were both controlled, the water absolutely, the food comparatively—in that it did not pass through the public markets and was therefore not handled by so many hands—the morbidity rate was very low. In one of the prisons from January 1, 1919, to September 1, 1920, 10,910 prisoners were taken care of, some being permanent guests and some temporary. There were only nine cases, with three deaths.

In the asylum for the insane food and water conditions are the same as in the above-mentioned jail. The number of permanent and temporary guests during the above period of time was 1,067, and there was but one case of cholera. It is interesting to note that during the course of the epidemic only one European suffered from the disease, the victim being the leader of the local Christian Science cult; the disease was fatal.

CONCLUSIONS.

(1) Given a city divided into two parts, one part having a pure water supply, while the other depends upon natural sources, all other sanitary and preventive measures being equal, and in this case non-effective, the morbidity rate under a pure water supply is 1.376 per 1,000, and under a natural supply 9.42 per 1,000.

(2) Rainfall produces an acute and temporary increase in the morbidity rate due to the extreme and temporary pollution of all natural water supplies, with special reference to the canals and rivers.

(3) The importance of the food supply as a means of transmitting the disease is emphasized during the dry season as a result of artificial irrigation and the use of night-soil as fertilizer.

(4) A two-dose vaccine is very unsatisfactory, as the first dose does not give sufficient immunity, and people so strongly object to a second inoculation that to enforce it, it would be almost necessary to have military assistance.

We wish to express our appreciation to Mr. Belhomme, the city engineer, for valuable assistance in preparing the graphs. The numbers used are guide numbers only, and will not total the numbers appearing in the tables.

THE DIFFERENTIAL DIAGNOSIS OF MALARIAL PARASITES IN THICK BLOOD SMEARS.

By J. PRATT-JOHNSON, M.B.Lond., D.P.H.Oxon.

THE differential diagnosis of the type of malaria from an examination of a thick film in the majority of cases presents no difficulty to the skilled and practised worker. Typical stages of the parasites may be found, e.g., crescent forms, fully developed schizonts, &c. In such cases the diagnosis is clearly indicated. Difficulty may arise, however, owing to

the fact that only ring forms are present and the parasites few in number. The individual characteristics of known ring forms have been closely studied in thick smears, and large numbers of drawings made and the distinguishing points carefully noted.

The differential diagnosis of ring forms in the blood is a more difficult matter in thick than in thin films, as the associated changes found in the red cells are not available for observation in the former instance. Whilst errors in diagnosis may occur when differentiation of type depends upon an examination of one ring only, the degree of accuracy obtained by a diagnosis based on the combined characteristics of numerous ring forms present in a film is sufficient for practical purposes.

Moreover, in benign tertian it is usual, after thorough search, to find in addition to ring forms more mature forms of parasites, while in malignant subtertian infections the ring forms present are all in the same stage of development, the more mature forms of this parasite not being found in the finger blood. The following table sets out for the *thick film* the main differences between the ring forms of the benign tertian and the malignant subtertian infections.

DIFFERENTIAL DIAGNOSIS OF "RINGS" IN THICK FILMS.

	Benign Tertian Rings	Malignant Rings
1. Size of rings	Large thin ring with relatively small chromosome	Small ring with relatively large chromosome.
2. Uniformity of size	Rings of varying size	Rings of uniform size.
3. Chromosome	Chromosome single	Double chromosome more common.
4. Shape	1. Fairly regular thickness of protoplasm.	1. Signet form common. Triangular or cone shape not uncommon, the protoplasm frequently appearing only slightly larger than the chromosome.
	2. "Ring" rarely a true circle, usually irregular.	2. "Ring" frequently a circle and clear cut.
5. Staining.	Fainter both of protoplasm and chromosome.	Tends to be more intense, especially chromosome.

Umbilical Concretions (Miles F. Porter, *Journ. American Med. Assoc.*).—The author is of opinion that chronic or periodic discharge from the umbilicus, accompanied by signs of infection, should always lead one to suspect the presence of a concretion. The condition has been mistaken for cancer, tuberculosis and dermoid cyst. Granulomas quite frequently form as a result of the long continued infectious process, and these may be, and indeed have been, mistaken for cancer. The treatment is simple dilatation of the opening, complete removal of the foreign substance, and the cleansing of the cavity.

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THE JOURNAL OF Tropical Medicine and Hygiene

JANUARY 1, 1921.

INTESTINAL STASIS.

In the *Practitioner* of December, 1920, Dr. J. C. Watt, of the West African Medical Staff, brings forward "a suggestion" in connection with the subject of intestinal stasis. The article is well worthy of perusal, for it discusses the question from

a broad and practical basis. Dr. Watt's suggestion is an extension of the principles laid down by Sir W. Arbuthnot Lane, and we consider that Dr. Watt's suggestion is sound in theory and should be tried in practice. It is none other than that the cæcum should be placed in the same position as other portions of the colon as being a factor of primary importance in producing stasis from its developmental history, from its anatomical position and the clinical evidence on the subject. He suggests that the cæcum below the level of the ileo-colic valve should be removed, so that there is no pocket for the accumulation of fæces, but that the contents of the ileum go directly into the lower end of the ascending colon. The appendix is, of course, removed by this proceeding to the benefit of the patient. Medicine seems to admit of failure in dealing with intestinal stasis, and has called in the surgeon to see what he can do in the matter. That the surgeon will succeed in establishing an acceptable mode of treatment for this well-recognized universal defect in our physiological economy is doubtful; that removal of this and that portion of the colon is likely to become as common as, say, that of the appendix, is, to say the least of it, unlikely, however scientific the principles of such treatment may be in theory.

The writer has occasionally directed attention in this journal to the prevalence of intestinal stasis amongst natives in tropical countries and compared their modes of dealing with it, with that adopted by those living in temperate climates. The cause of constipation amongst natives in tropical countries is due to an atonic condition of the colon dependent upon that indefinite etiological factor "climate," which includes physiological disturbances of several forms. To the climate is due the lessening of sufficient exercise amongst the well-to-do, whether native or Europeans. Amongst the poorer classes the insufficiency of food, especially of bulky foods of the fresh vegetable type, must be held responsible for the condition. The struggle for life amongst the crowded working populations of India and China is persistent and universal. They usually subsist on a barely sufficient diet, and when called upon to do systematic and regular work have to be supplied with a more ample diet to enable them to carry out their daily work. The diet then consists of rice, fat of pork (or fish), and vegetables in a dried state. None of these are calculated to give the colon much to do; there is little left in such a diet to reach the colon, and therefore little to stimulate the bowel to action. The starches and fats are digested and absorbed higher up in the alimentary canal, and before the colon is reached. The bulk of their ingested food is of the nature of "binding" food, and presents none of the "laxative" qualities brought about by the oatmeal, the bread, and the fresh vegetables of the type of cabbages, cauliflower, spinach, Brussels sprouts so largely consumed in temperate climates where these types of vegetable can be grown plentifully. It is therefore not a mere phrase to say that

"climate" is the primary factor in producing the intestinal stasis so prevalent in natives; it is not the effect of "climate" on the body directly that is to be thought of, but it is the kind of food the climate renders available for consumption that is the potent factor in producing the atony of the large bowel.

How is this stasis met with by the natives in tropical climates? First, the method of defæcation plays the foremost part. When they defæcate they use neither water-closets, nor privies, but they assume a "squatting" position. By this position the thighs are brought up against the front wall of the abdomen on either side, thus compressing the very parts—namely, the cæcum on the right and the iliac and rectal colon on the left, where stasis chiefly obtains. The anus is really the lowest part of the trunk, and the pressure exercised by the efforts at expulsion, owing to the immobility of the abdomen due to the pressure of the thighs against its front wall, is concentrated on the pelvic contents and defæcation thereby aided.

In the position of the body seated on high closet seats, be they water-closet or privy seats, the powers of expulsion are reduced to a low degree, and the fæces reach and rest upon a horizontal rectum instead of a more vertical rectum in the squatting position.

Another method adopted by the native to assist the atonic colon is by the presence in their food of large quantities of black pepper, red pepper, chilies, capsicum and those materials which go to make up curries of all sorts. Pepper and such-like vegetables we read in our "materia medica," &c., act upon the large intestine, and it is for this reason that the native with his atonic colon indulges so largely in these condiments.

In temperate climates constipation became a prominent factor with the advent of water-closets. Privies of a sort were in use before water-closets amongst the town dwellers and the better classes in the country; but up to recent years the farmers and their ploughmen and country dwellers generally assumed the squatting position and used the midden or the garden plot or the field and squatted at their stools, as do the tropical natives of to-day. With the introduction of closets the position at defæcation was changed and the upright position assumed, with the dire results we know of.

The dwellers in temperate climates treat the stasis thus induced not by pepper, &c., although peppers do find their way on to our dining table, but only as a flavouring and not in sufficient quantity to act as a rectal tonic. Instead of these, purgatives of sorts are used, some taking them in the form of salts in the morning, caseara and such-like drugs with each meal, or pills, powders, or concoctions of sorts at bedtime. These are taken daily as part and parcel of the diet, and the grace before and after meals includes these when we ask and return thanks for our daily bread. This artificial means of maintaining health cannot go on if we are to retain our national efficiency. It is long ago—1885—since the lecture on Degeneration amongst

Londoners was delivered by the writer in the Parke's Museum of Hygiene. It was laughed at in the press; comic papers found material for caricatures and comic rhymes. But since then two important members of our digestive tract have gone yet further awry. To such an extent is this the case with the teeth, that the writer at a large public hygienic gathering offered one shilling to every one of those present over 25 years of age who could show a six-year-old molar tooth, but no one came forward to claim the sum. To offer a reward to every member of the community, over 30 years of age, who did not take medicine or some sort of supplementary or artificial corrective to promote the action of the colon and induce thereby daily evacuation, would prove equally barren. It is impossible to raise a healthy nation on rotten teeth and purgatives.

The intestinal stasis is due primarily to the high seats of the water-closets. Some fourteen years ago the writer communicated a paper on the height of the water-closet seat at the meeting of the Royal Institute of Public Health in Aberdeen on the subject. A low seat was recommended, so that an approach to the squatting position in defæcation should be obtained. Trade interests were against it; but one firm took heed of the suggestion, and placed the low-seated closet on the market to the benefit of their firm and the advantage of those who used it. Another cause of stasis is insufficient ingestion of "laxative foods"—oatmeal, plain bread in place of toast, cooked green vegetables, Yorkshire pudding, fruit early morning, and at 11 a.m. in quantity. The juice of an orange will not promote the activity of the colon, but when the pulp of the orange is taken as well it will do so. The cauliflower leaves and stalk will do the same, whereas the flower only will not. It is the unabsorbable portion of the food that helps and provides bulk sufficient to fill the colon and stimulate it to action. Combine a more bulky food with one hour's sharp walk daily and use a water-closet with a low seat some 4 in. to 5 in. only above the level of the floor, and much of the stasis we know of will disappear.

Before, therefore, falling back on surgery let us try returning to the natural position in defæcation, and before resorting to drugs let us take food that gives us sufficient refuse material to give the colon work to do.

J. C.

—♦—
On the Viability of *Epidermophyton* (Hermann Dold, *China Med. Journ.*, vol. xxxiv, No. 1, January, 1920).—Some experiments were carried out by Dold to test the resistance of *Epidermophyton cruris* Castellani (syn. *E. inguinale* Sabouraud). Pieces of gauze were soaked in an emulsion of pure cultures, and the fungus was found to be active if kept at room temperature for nine days, or at 37° for six days. Active fungus was found in scales of diseased skin when kept at room temperature for twenty-nine days, but for only nine days when at 37°.

Annotations.

Erythromelalgia treated by Adrenalin (L. Chatellier, *Ann. de Der. et de Syph.*, 1920, pp. 261-264).—The author cured a typical case of this disease by one injection of a quarter of a milligramme of adrenalin, and concludes that this is evidence that erythromelalgia is a vasomotor neurosis.

The Influence of Creosote, Guaiacol and Related Substances on the Tubercle Bacillus and on Experimental Tuberculosis (L. M. De Witt, B. Suyenaga and H. G. Wells, *Journ. of Infect. Dis.*, August, 1920).—The substances of the creosote series do not appear to possess a high bactericidal power for the tubercle bacillus *in vitro*, and apparently not *in vivo*. The result is not surprising, in view of the observations of De Witt and Sherman, that tubercle bacilli are rather less susceptible to fat-soluble, and more susceptible to water-soluble antiseptics than bacteria less rich in fat than the tubercle bacillus. Also by their observation that fat-soluble dyes do not readily penetrate tubercle bacilli, while certain fat-insoluble dyes (e.g., methylene-blue) stain them well. Apparently the lipin-rich character of the tubercle bacilli does not make them vulnerable to fat-soluble antiseptics, but rather the reverse.

The failure to observe any beneficial therapeutic effect on tuberculous guinea-pigs is, in view of the low bactericidal power of the substances tested, to be expected. It does not mean, however, that these substances may not have value in open tuberculous infections in man in which other bacteria, in addition to *B. tuberculosis*, are involved.

The Treatment of Blackwater Fever (J. F. Gaskell, *British Med. Journ.*, p. 122, 1920).—The author comes to the conclusion that blackwater fever is due to a sudden hæmolysis in the blood-stream caused in cases of chronic malaria by administration of quinine, and that exposure or exhaustion is also an important factor. The histological changes found in the kidneys show that suppression is due to a coagulation of excreted hæmoglobin-containing material mainly in the region of the loops of Henle. The cause of suppression is thus mechanical.

Quinine should be stopped, and treatment should be directed to the prevention of this mechanical blocking, and also to the combating of toxic effects and collapse. The administration of fluids in quantity by every possible path is essential in order to dilute the products of excretion sufficiently to prevent coagulation, and also to dilute toxic products in the circulation. Not only should fluid be taken in quantity by mouth, but rectal salines should be given and continuous subcutaneous saline injections. This treatment should be started immediately the signs of blackwater fever appear.

Abstracts.

AN ACCURATE AND SIMPLE METHOD OF TESTING THE COAGULATION TIME OF BLOOD.¹

By GEORGE R. LOVE, B.S.

Chicago.

A METHOD has been devised and has been used by this Department for the past year by which the coagulation time can be determined within twenty seconds. The end-point is definite and is entirely independent of the judgment of the operator. The method here described employs capillary tubes, and resembles in principle McGowan's capillary tube method. We have used this method only in venipuncture work, having abandoned finger stabs as of little or no value.

PREPARING THE CAPILLARY TUBES.

Cut five-millimetre glass tubing (lumen diameter 3.5 mm.) into 5-in. lengths. Heat the middle 2 in. of these tubes over a fish-tail burner until the glass is soft enough to sag into the burner by its own weight. Remove from the flame immediately, draw out until the whole is 30 in. to 34 in. in length. Break the tubes in the middle so as to form two equal-sized capillary tubes. The lumen must be from 0.3 to 0.5 in. diameter.

PROCEDURE.

Paraffin some short test-tubes. Leave the test-tubes and the capillary tubes in the room where the test is to be made until they are at room temperature. The temperature of the room must be constant and must be known within one degree.

The blood is procured in the usual manner by applying a tourniquet above the elbow and puncturing the median basilic with a short 15 to 18 gauge needle from above downwards. The first few drops of blood are discarded, and then one to two cubic centimetres are collected in the paraffined test-tube. The capillary tubes are filled by dipping the drawn-out ends into the blood and sucking it up rapidly to the shoulders of the tubes. The time is recorded when the blood first enters the capillary tubes. Two or three tubes are filled, and the time noted when the blood enters each tube. The tubes are now laid flat upon a stand alongside the thermometer. At two minutes before coagulation should occur normally (*vide infra*), about two centimetres of the first tube are broken off, and the separated part is held before transmitted light and broken between the fingers in such manner that the proximate ends may be drawn apart parallel to each other without injuring the thread of fibrin. This process is repeated until the end-point is reached. The end-point comes when a thread of fibrin will stretch seven to ten millimetres across the break. The second and third tubes are not used if the end-point is reached in the first tube, except as a general check on the final end-point.

¹ Abstracted from the *Medical Record*, vol. xcviii, No. 11, September, 1920.

The time that the blood remains in the paraffined test-tube before drawing it up into the capillaries must not exceed two minutes. Repeated experiments have shown that if the blood flows from the needle into the test-tube in a stream, there will be no changes in the blood for two minutes which will affect the coagulation in the capillary tubes.

Addis was the first experimenter who recognized the effect of temperature upon the coagulation time in capillary tubes. The temperature must be recorded or the whole test is valueless. A chart gives the average coagulation time computed from a series of tests on twenty-six healthy dogs at different room temperatures. No appreciable variations were observed in the time of the coagulation of the blood from the different dogs.

In the illustration the foregoing data have been plotted, the regularity of the curve indicating the accuracy of the method employed. The curve seems to change its form at 29°, as though some new factor entered here. The general form shows that the coagulation of blood follows the law for ordinary chemical reactions, an increase of 10° doubling the rate of the reaction.

In a series of experiments the author has had physicians, medical students, and nurses duplicate his tests, all the operators drawing from the same blood, but working independently and with separate stop watches. The widest variation of all these duplicates was thirty seconds. These variations occurred only on the first attempts, the author's test always requiring the least time. This fact shows that the only skill necessary is in the process of breaking the tubes in such a manner that the proximate ends may be drawn apart without injuring the thread of fibrin. Accurate results can be expected only when these instructions are followed exactly. The author has made repeated tests on the same animals at a constant room temperature, and has calculated the normal coagulation time for each animal. In all these tests the greatest variation was less than fifteen seconds from the normal of that animal.

THE BEHAVIOUR OF BACTERIA IN FLUID CULTURES AS INDICATED BY DAILY ESTIMATES OF THE NUMBERS OF LIVING ORGANISMS.¹

By G. S. GRAHAM-SMITH, M.D., F.R.S.

In dilute neutral meat extract cultures (without salt or peptone) inoculated with relatively small numbers of *Staphylococcus aureus*, taken from agar cultures grown for eighteen hours at 37° C. and incubated at 37° C., multiplication proceeds rapidly during the first day and more slowly on the second, when the maximum number, about 10,000,000 per standard loop (0.01 c.c.), is reached. Later the number of living organisms decreases at first rapidly, but later more slowly, until a low level is reached, which remains fairly constant or falls very slowly

for a long period. During the period of relative constancy small oscillations are observed. The curve produced on plotting out the daily counts may be regarded as a "standard."

The frequency with which the culture used for inoculation has been transplanted on agar slopes influences the growth on neutral meat extract. Several transplantations in rapid succession result in very rapid growth, a high maximum, and a very rapid fall in the numbers. Less frequent transplantations over a long period seem to cause the maximum to be reached later than in the standard and the period of decline to be postponed.

In one series of experiments the proportion of meat extract was varied in the different tubes employed. These experiments show that the greater the proportion of meat extract the greater is the multiplication, and the longer the period which elapses before the curve reaches its highest point; in fact, the extent of multiplication appears to be closely related to the amount of meat extract present in the culture. The length of the period of rapid decline is also related to the amount of meat extract present.

The form of the curve of growth is influenced by the number of cocci inoculated. With a small inoculation into dilute neutral meat extract the maximum number of cocci present in the medium at any period does not usually exceed 10,000,000 to 12,000,000 per standard loop. If the initial dose greatly exceeds this figure multiplication proceeds relatively slowly for two days, and subsequently there is a very rapid fall in the numbers. With an initial dose close to this figure a somewhat similar curve is produced, though the rate of fall is not so rapid. Much smaller doses produce "standard" types of curves.

If the numbers have reached a low level and small drops of concentrated meat extract, insufficient to cause appreciable dilution, are added to the culture further multiplication occurs, to some extent proportional to the amount of food material added. The fall in numbers, which follows the initial rise, is not due therefore to the accumulation of products, but seems to be caused mainly by the using up of food material.

Provided the numbers inoculated are small (50,000-50 per drop), the results after twenty-four hours' incubation in different experiments of the same kind are not materially affected.

By small regular additions of food material (concentrated meat extract) a definite concentration of staphylococci can be maintained in a meat extract for a long period of time, and probably by suitable additions any desired concentration may be maintained. Accumulation of the products may gradually inhibit growth, but on this point the experiment gives little evidence.

Moderate dilution with distilled water at any stage of incubation has little effect. Events occur in the usual sequence, but the number of organisms in each standard drop is proportional to the dilution.

The incubation temperature has a great influence on the course of events in meat extract cultures of

¹ Abstracted from the *Journal of Hygiene*, vol. xix, No. 2, October, 1920.

S. aureus. At 37° C. multiplication during the first twenty-four hours is very rapid, the maximum is attained on the second or third day, and the numbers fall very rapidly. At 27° C. the maximum is attained on the fifth or sixth day, and is considerably greater than that attained at 37° C. The fall is rapid. At 17° C. multiplication is very slow during the first forty-eight hours, but is subsequently rapid, and the maximum, which is higher than that attained at 27° C., is reached on the eighth day. The decline in numbers is slow.

At 8° C. to 10° C. very slight multiplication, if any, occurs during the first twenty-four hours, and subsequently the numbers steadily decline for at least sixty days.

At lower temperatures the numbers fall rapidly and the cultures die. At -1° C. the organisms were dead by the nineteenth day, at -6° C. by the thirteenth day, and at -10° C. by the ninth day.

If organisms such as *S. aureus*, *B. coli* or *B. pyocyaneus* are allowed to grow in meat extract medium at 37° C. until the numbers have reached a low level, and the tubes are then inoculated with the species originally present little or no multiplication takes place, but if one of the other organisms is inoculated multiplication of the added organisms occurs. If the cultures are sterilized by boiling before inoculation with fresh organisms the original strain or the others, when added, multiply. Boiling, therefore, appears to liberate some food for added organisms belonging to the strain which was originally present.

The growth of any of these organisms in the medium seems to remove most of the food for that species as well as a portion of the food substance used by other species, since in no case was the growth of the added species nearly so considerable in extent as in its primary cultures.

The effect of adding increasing quantities of N/10 hydrochloric acid up to 0.3 c.c. to each 5 c.c. of the medium is to retard the growth of the cocci during the earlier stages of incubation, though subsequently rapid growth takes place, and a high maximum is reached. With small inoculations of cocci the addition of more than 0.3 c.c. N/10 hydrochloric acid results in the death of the organisms within a short time.

With additions of N/10 soda varying between 0.4 and 1.2 c.c. there seems to be a progressive decrease in the height reached by the maxima, the rate of growth in the early stages is retarded, and the rate of decrease in numbers seems to be retarded. With the addition of 1.6 or 1.8 c.c. N/10 soda the rate of growth in the early stages is markedly retarded. With the addition of 2 c.c. N 10 soda no growth occurs.

B. coli seems to be more sensitive than *S. aureus*, especially to the addition of alkali.

More precise experiments with N/10 hydrochloric acid show that with the addition of increasing amounts of the acid the type of curve gradually changes from a "standard" with one peak to a curve with two peaks, separated by an interval in which the numbers are small.

By continuous growth in acid, neutral and alkaline meat extract the capacity of *S. aureus* to multiply when transplanted into media of different reaction is altered. When transferred into an acid medium all strains show a small primary rise followed, after a fall in the numbers, by a great secondary rise. In the case of the acid acclimatized cocci the secondary rise reached its maximum on the seventh day, in the neutral acclimatized cocci on the thirteenth day, and in the alkali acclimatized cocci on the fifteenth day. In the neutral medium there is also a primary and a secondary rise, but the former is much greater than the latter. In the case of the acid acclimatized cocci the primary rise was least in height and duration, and in the case of the alkali acclimatized cocci greatest both in height and duration. In the alkaline medium a primary rise occurs, and subsequently the numbers fall to a very low level. The rise was least in the acid acclimatized cocci and greatest in the alkali acclimatized cocci.

In comparing these experiments with others previously quoted, it should be remembered that the organisms have been acclimatized to growth not only in media of different reactions, but also to continuous growth in fluid meat extract medium.

S. aureus can multiply to a small extent in neutral gelatin solution (8 per cent.). On a medium consisting of gelatin and meat extract the greatest multiplication takes place, much higher figures being obtained than the maxima of growth on gelatin solution and meat extract respectively added together. In agar solution (0.8 per cent.) alone no multiplication takes place, and the cocci quickly die. In a medium consisting of agar and meat extract the maximum reached is lower than in meat extract, but the decline in numbers is slower.

When certain quantities of various acids are added to warm meat extract agar precipitates are formed, though little or no precipitate may be produced by lesser or even slightly greater quantities. In some instances no growth has occurred in plates poured from those tubes in which a precipitate had formed.

The addition of glucose to the extent of 1 per cent. to dilute meat extract results in most cases in *S. aureus* multiplying rapidly during the first day. Subsequently the numbers decline and the culture dies. With increasing quantities of glucose the maximum figure attained diminishes, and the rate of the subsequent fall, at least from the second to the fourth day, increases. Even with very small quantities of glucose the numbers begin to fall after twenty-four hours' incubation, instead of rising as they do in cultures without glucose.

If to cultures containing 1 per cent. glucose daily additions of small quantities of concentrated meat extract or of concentrated meat extract with glucose are made oscillations in the numbers occur, but the cultures remain alive, and with large additions multiplication may take place. The death of the organisms is not hastened by small daily additions of glucose.

The addition at different times of small numbers

of the cocci to growing cultures of *S. aureus* has no appreciable influence, but the addition of large numbers exerts a considerable influence.

In meat extract cultures of *S. aureus* incubated at 37° C. about 15 per cent. of the living organism sink to the bottom after each daily shaking. If the tubes are left undisturbed about 25 per cent. sink to the bottom.

Meat extract incubated with chloroform for twenty-four hours at 37° C. and sterilized by boiling seems to be a slightly better medium than fresh meat extract sterilized by boiling or autoclaving immediately after preparation. Pancreas extract is a better medium than meat extract. The multiplication of cocci is greatest in pancreas extract incubated with chloroform for twenty-four hours at 37° C. and sterilized by boiling.

Organisms accidentally contaminating cultures of *S. aureus* may cause, according to their species, a sudden decline or a rapid increase in the number of the cocci.

Reports and Reprints Received.

"Démonstration du Rôle pathogène du *Balan-tidium coli*: Enkystement et Conjugaison de cet Infusoire." Brumpt. Extrait des *Comptes rendus des Séances de la Société de Biologie*, tome lxvii, p. 103, 1909.

"Guérison de la Maladie du Sommeil chez le Lérot vulgaire en hibernation. Action de froid sur le *Trypanosoma inopinatum* (in vivo)." Brumpt. Extrait des *Comptes rendus des Séances de la Société de Biologie*, tome lxiv, p. 1147, 1908.

"Rôle pathogène et Mode de Transmission du *Trypanosoma inopinatum*, Ed. et Et. Sergent. Mode d'Inoculation d'autres Trypanosomes." Brumpt. Extrait des *Comptes rendus des Séances de la Société de Biologie*, tome lxi, p. 167, 1906.

"Au sujet du Traitement de la Maladie du Sommeil, Réponse à M. le Professeur Laveran." Brumpt. Extrait des *Comptes rendus des Séances de la Société de Biologie*, tome lxi, p. 316, 1905.

"Expériences relatives au Mode de Transmission des Trypanosomes et des Trypanoplasmes par les Hirudineés." Brumpt. Extrait des *Comptes rendus des Séances de la Société de Biologie*, tome lxi, p. 77, 1906.

"Existence d'une Spirochétose des Poules à *Spirocheta gallinarum* dans le Pays Somali." Brumpt. Extrait des *Comptes rendus des Séances de la Société de Biologie*, tome lxvii, p. 174, 1909.

"Researches on Egyptian Bilharziosis." Leiper. *Journal of the Royal Army Medical Corps*, vols. xxv, xxvii, xxx, 1918.

"La Production expérimentale des Bilharzioses égyptiennes." Leiper. Extrait du *Bulletin de l'Institut égyptien*, série v, tome x, 1916.

"Observations on the Mode of Spread and Prevention of Vesical and Intestinal Bilharziosis in Egypt, with additions to August, 1916." Leiper. *Proceedings of the Royal Society of Medicine*, vol. ix, 1916

"Pyrexie mortelle à Allure spéciale, causée par un Flagellé à la Guyane française." Léger. Extrait des *Annales de l'Institut Pasteur*, tome xxxiv, p. 481, 1920.

"Triennial Report on the Working of the Hospitals and Dispensaries in Bihar and Orissa, for the years 1917-19." By the Hon. Lieut.-Colonel H. Austen Smith, C.I.E., M.B., B.C., I.M.S.

"Report of the Health Officer of Calcutta, 1919." By H. M. Clarke, M.D., D.P.H.

Correspondence.

TREATMENT OF ULCUS TROPICUM.

To the Editor of "THE JOURNAL OF TROPICAL MEDICINE AND HYGIENE."

SIR,—Having had a large experience in the treatment of ulcer tropicum, I have found the best results, apart from surgical treatment, to be obtained by the injection of kharsivan, combined with potassium-iodide by the mouth. Patients do better in hospital, but it is impossible to crowd up the hospital with such cases. Externally I use a moist dressing, lint soaked in lysol solution ($\frac{1}{2}$ per cent.) and covered over with a bit of the young leaf of the banana, an excellent substitute for protective, costing nothing and easily obtained. When the sore is clean and granulating a dusting powder of iodoform and boracic powder (1 in 12) is used. Kharsivan can be injected intramuscularly at the dispensaries or at the patients' homes without any special apparatus and with practically no risks, though of course with a certain amount of pain. Besides the marvellous quickness with which the sore heals up, a striking feature is the apparent improvement in the general health and appearance of the patient.—Yours truly,

W. G. HEATH,
Montserrat.

November 18, 1920.

Medical News.

UNIVERSITY OF LIVERPOOL EXAMINATION LIST.

DIPLOMA IN TROPICAL MEDICINE.

THE following gentlemen have been awarded the Diploma in Tropical Medicine: S. Adler, M.B., Ch.B. Leeds; G. Campbell, M.B., Ch.B. Glasgow; Evelyn M. Connolly, M.B., B.Ch., B.A.O. Ireland; C. E. Lim, M.B., B.S. Hongkong; G. B. McHutchinson, M.D. Dublin; F. Z. van der Merwe, M.B., B.Ch., B.A.O. Dublin; H. W. L. Walker, M.B., Ch.B. Liverpool.

THE Fourth Congress of the "Far Eastern Association of Tropical Medicine" will take place at Weltevreden (Batavia) in August, 1921. The President is Dr. Byker, and the Vice-President Dr. W. Th. de Vogel.

Original Communications.

A PATIENT HARBOURING *SCHISTOSOMA JAPONICUM* CURED BY TARTAR EMETIC.

F. G. CAWSTON, M.D. Cantab.

THE value of the complement-fixation test is well brought out in those cases of *Schistosoma* infestation where the eggs of the parent worm are few or difficult to find. In the vast majority of persons harbouring *Schistosoma hæmatobium* the eggs in the urine are so numerous that the diagnosis is relatively simple. With *S. japonicum* and *S. bovis* however the eggs do not occur in the urine and, though many of them may be passed by the bowel, they are not so easily detected.

In such cases however, the antigen test sometimes throws light upon the diagnosis and it is of great interest to know that such an antigen prepared from *Physopsis africana* infested with the cercariæ of *S. bovis* has been shown by Dr. W. A. Murray to give a positive reaction in sheep harbouring *Fasciolæ* as well as in patients harbouring either *S. hæmatobium* or *S. japonicum*.

This antigen test introduced by Hamilton Fairley is of especial importance in these conditions, because it may be the only means of determining when we can safely discontinue treatment in such infections. In treating persons harbouring *S. hæmatobium* we are guided as to dosage very largely by the gradual degeneration of the eggs that are continually escaping in the urine passed and, at times, treatment would appear even to increase the number of disorganized eggs in the urine. As this degeneration continues, we have a very fair means of determining how far the parent worms are also being destroyed, but in persons who harbour *S. japonicum* and in fluke-infested sheep it is impossible to secure a regular series of microscopic examination of the eggs that are being passed, or to judge how far the degenerative process has advanced in the case of the parent worms.

The eggs of *S. bovis* which have been obtained from guinea-pigs experimentally infested with schistosoma from *P. africana* in the Durban suburbs at all times of the year, are uniformly about the same size, '175 mm. by '04375 mm. The adult worms are bulkier than *S. hæmatobium*, but resemble them very closely. On February 12th, 1920, I secured 143 adult *S. bovis* from one guinea-pig which had received numerous cercariæ from *P. africana* 128 days before. The vast majority of these adult worms were males.

Recently I was asked to examine the urine of a patient who had undergone a complete course of treatment by Dr. G. C. Low some months previously. Although there were no eggs present in the urine, a positive reaction was obtained with the antigen test. This might indicate the presence of some male adult worms, but this is unlikely, for, from the experience of some other cases which gave a positive test where the patient was clinically free from Bilharzia worms, it would seem that a positive reaction is occasionally obtained in patients who are suffering from genito-urinary conditions following Bilharzia infection which

are not necessarily due to the presence of adult parasites.

I have recently had under treatment a patient who acquired infection from *S. japonicum* at Hunan, China, thirteen years ago. It is interesting to note that he had been through a prolonged course of injections with emetine for dysentery in East Africa without apparently the slightest effect on the schistosomes. When treatment was commenced at Durban he was suffering from occasional attacks of diarrhoea, and had recently passed a good deal of mucus from the bowel. Examination of the fæces by Dr. W. A. Murray, of Durban, revealed the presence of only one non-spined egg containing a miracidium. As a definitely positive reaction was obtained to the antigen test nine days previously, a series of antimony injections had already been commenced.

The initial dose injected on October 6th was $\frac{1}{2}$ gr. antimonium tartrate dissolved in 2 c.c. of boiling distilled water just before use. $\frac{3}{4}$ gr. was given on October 7th and 9th, and 1 gr. on October 11th. The patient was treated as an out-patient throughout. On November 5th he had received a total of $20\frac{1}{2}$ gr. antimonium tartrate and $1\frac{1}{2}$ gr. of cacodylate of soda which was injected into the muscle. The patient did not seem to tolerate arsenic at all well, so that it was not continued. $1\frac{3}{8}$ gr. was the largest dose of tartar emetic in solution given. For this he developed the usual tolerance, though the drug produced a good deal of depression during the first ten days.

On December 2nd, when the general condition of the patient had materially improved, and his indigestion and passage of mucus disappeared, Dr. W. A. Murray tested the reaction of his blood and found the serum gave a negative reaction. As this laboratory report is supported by clinical evidence, we may take it that the schistosomes have been destroyed by this series of injections of tartar emetic.

SUGGESTIONS FOR FURTHER RESEARCH IN SCHISTOSOMIASIS.¹

By FRANK MILTON,

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THE question of the possible spread of schistosomiasis to countries hitherto exempt has acquired great importance in the last few years, and in order to be in a position to judge of the possibilities of this, definite answers are required to the following questions:—

(I) Are the different species of the human schistosomes inimical to each other?

(II) Why are certain countries which seem in every way suitable for schistosomes apparently exempt from schistosomiasis?

(III) Can schistosome larvæ accommodate themselves to new species of intermediary hosts?

¹ A paper read before the "Staff Club" at Kasr-el-Aini, February 28, 1920.

(IV) Does an attack of schistosomiasis confer immunity against subsequent attacks?

(V) Are schistosomes at present accepted as being of the same species in different parts of the world really identical?

Before considering these propositions in detail, it may be as well to run over the established facts in connection with schistosomiasis.

The disease schistosomiasis is caused by a blood parasite, of which there are three species, having man as their definitive host. These are *Schistosoma hæmatobium*, *S. mansoni*, and *S. japonicum*.

The area of their activities forms a belt round the entire globe between, roughly, 35 degrees north and 35 degrees south of the Equator.

Within this belt practically every country is known to be infected, some more heavily than others, with apparently but two important exceptions, these exceptions being the whole of India and the Southern States of North America.

The distribution of the three species of the parasite is unequal and somewhat peculiar.

S. hæmatobium flourishes chiefly in Northern and Southern Africa and in South Western Asia.

S. mansoni chiefly in Western, West Central and Central Africa, Central and South America, and the West Indies.

S. japonicum is indigenous only in China, Japan and the Philippine Islands.

All three species of the parasite have the same life-cycle, the mature worm in man producing eggs which pass out of the body with the host's excreta. These eggs hatch out on coming into contact with water, and produce miracidia which are free swimming organisms, and have to depend upon their own exertions to find harbourage in their intermediary host.

This intermediary host is, in all cases, some species of fresh-water mollusc. The miracidia having selected their host, make their way through its tissues to its digestive gland, where they develop into sporocysts and daughter cysts, the parasites eventually leaving the host as free swimming, furcercous cercariæ.

These cercariæ, again, have to depend upon their own efforts to find their definitive host, man.

When found they gain entrance to his tissues by burrowing through the healthy unbroken skin or mucous membrane of the mouth and throat, perforation being assisted by the secretion by the parasite of a solvent which appears to attack the intercellular substance of the skin.

On entering the tissues of the definitive host the cercariæ lose their tails and become agamodistomes.

As agamodistomes they make their way, for the most part, into the venous radicles, though some few pass by the lymph vessels into the portal vein, whence, on arriving at early maturity, they pass to their final destination in the mesenteric, vesical, or hæmorrhoidal veins, according to their specific habits, there to become mature worms, and to produce eggs for the recommencement of the cycle.

Among the human schistosomes each species has

its own intermediary host, and appears to be confined to one genus of that host. Thus *S. hæmatobium* appears to develop only in *Bullinus*, or in *Physopsis*, a sub-genus of *Bullinus*, *S. mansoni* in *Planorbis*, and *S. japonicum* in *Hypsobia*.

We are now in a position to take up our questions *seriatim*.

(I) Are different species of human schistosomes inimical to each other?

In reviewing the geographical distribution of schistosomiasis, one is forcibly struck by the fact that each particular species of human schistosome has a very definite area, in which it is either markedly predominant or else exists to the exclusion of both the other forms.

Thus in South Africa *S. hæmatobium* appears to be the only form met with, though *S. mansoni* is rampant in Central Africa, and has even invaded certain parts of the Low Veldt in the south.

In the Congo State and Central Africa generally *S. mansoni* appears to reign alone; in the New World neither *S. hæmatobium* nor *S. japonicum* has been described, except in a few isolated cases which have been shown to have been infected elsewhere. In China, Japan and the Philippines *S. japonicum* exists to the absolute exclusion of any other form.

It is true that in Egypt and on the whole southern littoral of the Mediterranean the two forms *S. hæmatobium* and *S. mansoni* exist side by side, and may indeed infest the same individual, but even here the one form, *S. hæmatobium*, is overwhelmingly the more common, and keeps the other in subjection, so much so that whilst pure infections by *S. hæmatobium* are the rule, pure infection by *S. mansoni* is unknown among those native to the country.¹

It may be argued that the distribution of the schistosomes must necessarily follow the distribution of their specific intermediary hosts, but that this is not altogether a sufficient explanation is evidenced by the fact that, whilst *S. mansoni* is absent from South Africa, its host *Planorbis* is amongst the most common molluscs of the country, likewise this same genus, *Planorbis*, is well represented in Mesopotamia, where *S. hæmatobium* flourishes in the absence (?) of *Bullinus*, but *S. mansoni* is unknown, and also in India, where no form of schistosomiasis is met with.

We have to acknowledge the fact that the schistosomes parasitic in animals do not appear to be

Cases of pure infection by *S. mansoni* have been recorded by recent authors describing the disease as seen among British troops in Egypt, but it must be remembered that these troops are under artificial conditions as compared with the inhabitants of the country, inasmuch as they have only been a limited time in the country, and that whilst there they have been protected as far as possible from infestation, so that the ordinary laws of infection common to the country have not been able to act. What the statement amounts to is, not that every one infected by *S. mansoni* must necessarily at the same time be infected with *S. hæmatobium*, but that whilst *S. mansoni* is comparatively rare, and only attacks a certain proportion of the inhabitants, *S. hæmatobium* is so common that it attacks practically everybody, whether they are infected with *S. mansoni* or not.

mutually exclusive, since in India alone three or possibly four different species are known to exist, but the geographical limitations of the human schistosomes are so clearly defined that there seems ground for believing that some law of exclusion through pre-occupation may exist, the details of which have yet to be worked out.

(II) Why are certain countries apparently exempt from schistosomiasis?

The most extensive of these apparently immune countries is the geographical entity known as India.

India embraces a very wide range of climate and is inhabited by many races of man. The climate in many parts is favourable to the existence of schistosomes, and the mode of life and habits of vast numbers of the population are such as should favour the propagation of parasites with such a life-cycle as the schistosomes.

In order that a digenetic trematode parasite may flourish in a given locality, six things would appear to be necessary:—

(1) The introduction of the parasite.

(2) A climate and general conditions suitable to the well-being of the parasite in all its stages of development.

(3) A suitable intermediary host.

(4) A suitable definitive host.

(5) Conditions of existence of these hosts, enabling the parasite, as miracidium and as cercaria, to gain ready access to them.

(6) The absence of any peculiar local conditions impeaching the development of the parasite in any of its stages.

As to No. 1, it is known that two, at any rate, out of the three species of human schistosomes have been introduced into India on numberless occasions, and at the present moment there is a colony of returned Imperial Service troops at Bolarum, in the Hyderabad State, known to be carriers of *S. hæmatobium*, with, probably, some carriers of *S. mansoni* also among them.

(2) The climate of tropical and semi-tropical India is well suited to the existence of schistosomes, as is evidenced by the existence in the country of several species of the parasites among the animals.

(3) Whilst the genus *Bullinus*, the host of *S. hæmatobium* is said not to occur in India,¹ the genus *Planorbis*, the carrier of *S. mansoni*, is common throughout the country.

(4) and (5) The definitive host of the human schistosomes lives in India under ideal conditions for infection by the parasite.

(6) By inference there should be some peculiar local cause preventing the development of the recognized species in the country. That neither *S. mansoni* nor *S. japonicum* does exist in India must be taken for granted. The symptoms of the disease caused by the first are so striking that it is not possible that the disease could exist and fail

to be identified. The symptoms due to *S. mansoni* and *S. japonicum* are much less obvious, but considering the number of highly qualified observers working in the country, it is impossible to believe that the disease, if present, could have escaped identification.

Considering the immense area of the country and the great number of races of men living there, and taking into account that these various peoples live under all sorts of conditions, some possibly unfavourable to the propagation of the parasite, but many more under peculiarly favourable conditions, it cannot be imagined that there is any generally acting cause inimical to the parasite either in the country itself or in its inhabitants.

Even supposing there were something in the conditions of life in India inimical to the existence of the human schistosomes, why should these be absent also from that other extensive geographical unit, the Southern States of the North American Union? Here, whilst the conditions of life and the races of men are widely different from those present in India, and although the climate, &c., is favourable, the recognized species of the human parasite are equally unknown.

Schistosome cercariæ, fulfilling the conditions laid down by Leiper as necessary to the members of the bilharzia group of schistosomes, do exist in America, and have been identified as far north as 42 degrees, but none of the cercariæ recognized are identical with either *S. hæmatobium*, *mansoni*, or *japonicum*, and are none of them recognized as being parasitic in man.

In India also schistosome cercariæ, fulfilling the conditions of the bilharzia group, have been identified by both Sewell and Annandale, and the former has described a cercaria under the tentative name of *C. indicæ* XXX, which he declares to be exactly similar, if not identical, with the cercaria of *S. japonicum*.

The only solution of the difficulty appears to me to lie in the theory of pre-occupation of these countries by some other, as yet unidentified, human schistosomes, the existence of which is inimical to the existence of the other recognized forms.

The explanation is vague, and the indications of the existence of such a law are but meagre, but can any of you suggest any other reason for the apparent absence of the parasite from these enormous areas of the world's surface?

(III) The third question is: Can schistosome larvae accommodate themselves to new species of intermediary hosts?

As far as we know, at present, each species of human schistosomes is confined to a particular genus of fresh-water mollusc, *S. hæmatobium* to *Bullinus*, *S. mansoni* to *Planorbis*, and *S. japonicum* to *Hypsobia*, and in any particular country or locality they seem to be confined to one species, or to one or more very closely allied species, in these genera, but in widely separated localities whilst remaining confined to the same genus they may infest a different species.

¹ *Bullinus* was officially declared not to exist in Palestine, and bilharziasis to be absent from that country; but Searle has shown that this is erroneous.

Thus *S. hæmatobium* has been found in *Bullinus contortus*, *B. dybowski* and *B. innesi* in Egypt (species regarded by Kemp and Gravely as probably "merely local races or varietal forms of *B. contortus* and not distinct species"), but it inhabits *Physopsis africana* in South Africa.

S. mansoni infests *Planorbis boissyi* in Egypt, *P. olivaceus* in Brazil, and *P. guadelupensis* in Venezuela; though here again *P. olivaceus* and *P. guadelupensis* have been declared by Leiper to be very similar to each other, if not identical.

S. japonicum infests *Hypsobia nosophora* in Japan, but as this species of *Hypsobia* does not exist in China, it must infest some other species in that country, probably *H. humida* or *H. minuscula*.

This is the general rule, but we have suggestions, in neither case to be quoted is it more than a suggestion, that there may be wider differences in some localities.

Thus Boulenger seems to suggest that *S. hæmatobium* has, in Mesopotamia, adapted itself to a new genus in the absence of *Bullinus*, since in investigating an outbreak of schistosomiasis at the General Hospital, Basra, he records the absence of *Bullinus*, but notes that a *Lymnaeus*, a *Planorbis*, *Melania tuberculata* and *Melanopsis nodosa*, were abundant in the creeks, pools and irrigation channels of the neighbourhood. If this suggestion is found to be supported by fact, we have here an example of adaptation not only to a new species, but also to a new genus.

Sewell suggests that his *C. indica* XXX is very possibly identical with *S. japonicum*. This cercaria he found in *Planorbis crustus* or in a form of *Limnaea amygdalum*. Should these parasites prove to be identical, we have an adaptation not only to a new species and a new genus, but to a new family and a new order, *Planorbis* being of the family *Planorbidae*, and the order *Pulmonata* and *Hypsobis* of the family *Hydrobiidae* and the order *Pectinibranchiata*.¹

Experimental infection of unusual species of molluscs has been attempted in various parts of the world. Iturbe and Gonzalez claim to have infected *Ampullaria lutosoma* and *Planorbis cultratus* with *S. mansoni* in Venezuela, Lutz to have infected *P. ferrugineus* and *P. tenographilus* with *S. mansoni* in Brazil, and Miyari a species of *Lymnaea* with *S. japonicum*, but confirmation of this work would be welcome.

¹ Among furcocercous cercariæ closely related to the schistosomes specificity as regards intermediary hosts is not strongly marked. The study of these larvæ is still in its early stages, yet we may note the following infestations as cases in point.

An unnamed a-pharyngeal, non-eye-spotted form discovered by Annandale in *Gyraulus convexiusculus* and in *G. euphraticus* in one locality.

C. gigas, a-pharyngeal but eye-spotted in *Planorbis trivolvis* and in *Physa gyrina*.

C. douthitti, a-pharyngeal but eye-spotted in *Lymnaea reflexa*, *L. stagnalis oppressa*, *L. stagnalis perampla*, and in *Physa acicillaria parkeri*.

The possibility of schistosome larvæ developing in new hosts will ultimately depend upon their power of adaptability.

It must be remembered that the infestation of the intermediary host by the schistosome is not a mere passive infestation such as takes place in so many parasitic diseases where the parasite depends upon chance to bring it into contact with its new host, but is brought about by the activity and initiative of the miracidium itself, and this activity and initiative implies powers of either selection, or recognition of, and response to outside influences.

These powers being granted, it follows as a fundamental law of Nature that they will vary in degree in different individuals, some will possess them in a moderate and some in a much higher degree.

We suspect, if we do not know, that the miracidia are guided in their choice of hosts by a species of attraction, probably chemotactic in its nature, exerted by certain species of molluscs towards it.

It has further been shown that this attraction is exerted in a great degree by the usual hosts of the schistosomes, by certain species of molluscs which habitually become the hosts of the parasite, and it has also been shown that certain other molluscs exert the same attraction for them but in a lesser degree.

Thus Leiper in 1915 showed that a definite attraction for freshly hatched miracidia of bilharzia was exhibited by *P. boissyi*, by a species of *Bullinus*, by *P. forsaki* and by *L. trunculata*, whilst in 1918 Roubaud, working with indigenous snails from the neighbourhood of Paris, showed that a certain degree of attraction for cercariæ of *S. hæmatobium* from Senegal was exhibited by specimens of *P. albus* and *L. limosa*.

If we accept the infection experiments of Iturbe and Gonzalez and of Lutz referred to above, we have evidence that varied degree of attraction from the slightest up to the strongest, followed by penetration of the mollusc with arrest of development within its tissues, right on to the formation of sporocysts and the liberation of viable cercariæ, has been traced in species and genera of molluscs not usually the host of schistosomes.

Having proved this, and deducing therefrom the existence of the elements of the power of adaptability in schistosomes and the variation in the strength of that power in individuals it would seem that under favourable conditions and in the absence of their usual host (the attraction of which would seem to be capable of overpowering the lesser attraction of all other species), schistosomes are able, in Nature, to adapt themselves to new intermediary hosts, and as a result may become established in countries where their usual molluscan host does not exist.

The process of adaptation would probably be brought about as follows:—

A case of schistosomiasis is introduced into this new country, and the eggs are disseminated and the miracidia hatched out.

It is quite possible that many thousands of miracidia may be hatched which are unable to adapt themselves to the species of molluscs with which they are brought into contact, but at last some of the miracidia will appear with greater power of adaptability than the average.

It will then happen that these individuals will attack and penetrate the tissues of the molluscs and develop into cercariæ, which may or may not be sufficiently fortunate to find a further definitive host in whom to complete their life-cycle.

Many hatches of miracidia and cercariæ may be necessary before all this is brought about, but if the power of adaptability does exist in the schistosomes the ultimate result is certain, though the period of time necessary to bring it about may be long.

It may even be that miracidia which shows this degree of adaptability may not, in all cases, develop finally into mature worms, the whole of whose offspring are adapted to the new host, though the probability of their descendants possessing this power will be much greater than in the case of descendants of individuals which have not hitherto been called upon to exhibit or develop this power of adaptability.

It may well then occur that:—

(1) After the introduction of cases of schistosomiasis into a new country, a period of time—the “period of invasion”—will pass before miracidia are produced capable of adapting themselves to the molluscan fauna, i.e., before the disease can be passed on to the human inhabitants of the country.

(2) Sporadic cases may then occur among the inhabitants of the newly invaded country without the disease appearing to make headway during this “period of adaptation.”

(3) After a certain number of sporadic cases have occurred, through whom the process of natural selection among the parasites has progressed, a race of schistosomes will eventually be developed which is perfectly adapted to the new molluscan host, and the “period of occupation” of the country will have commenced.

If all this is so it follows that too much importance must not be attached to failure of endeavours to infect new species of intermediary hosts artificially in the laboratory, for if it be true that adaptability can only be established through selection, it may well follow that it may take any number of experiments before a sufficiently adaptable miracidium is brought into intimate contact with the right species of new potential host.

It is now necessary to see if established facts can be found to support this theory of adaptability, and the test here is the occurrence of sporadic cases in countries where schistosomiasis is otherwise unknown.

Literature reveals the fact that such cases do occur. Thus Faichnie, in the *Journal of the Royal Army Medical Corps*, describes the case of a woman in England who had lived all her life in the neighbourhood of the Thames estuary, and who had

never been out of England, who contracted the disease, though from what source is not known.

Freeman, in the same journal, describes a case where a soldier who had also never been out of England became infected, the disease in his case having probably been acquired through other soldiers stationed in the same camp who had brought the disease from South Africa.

Wardrop gives two cases of soldiers who contracted the disease in India about six months after their arrival in the country. Powell a case of a native of Bombay who had never been out of that Presidency. Nelson two cases in Western Australia, both of whom lived in the vicinity of a man who was suffering from the disease contracted in the Transvaal, and though this is not a case of human infestation, Marotel gives a case of a cow bred and reared in the South of France which died of *S. bomfordi*.

It is interesting to note that all these human cases were cases of *S. harnatobii*, the most easily identified form of the disease, and it is quite possible that cases of *S. mansoni* or *japonici* may have occurred and escaped identification elsewhere.

As all these cases occurred in countries where the disease is not endemic, it follows that the molluscs of the localities in which the disease was contracted must have become infected with the miracidia of the parasite brought from a distance—that is to say, the larvæ of the schistosomes from a foreign country had adapted themselves to the indigenous molluscs of the places where the new cases arose, though whether the species of molluscs differed from those usually harbouring the parasite cannot, in the absence of identification, be said.

Direct experimental proof of adaptability, carried over a sufficient period of time and in a sufficient number of cases, is still wanting, and the facilities offered for such by this country are many.

The last question is of importance because, according to the way it is answered, will depend the safety of countries to which infected troops have returned from the late war.

(To be continued.)

Acarodermatitis c Copra (Christian Ditlevsen, *Arch. f. Schiffs. u. Trop.-Hyg.*, vol. xx, No. 23, December, 1916).—The author describes several cases of Castellani's copra-itch developed by workmen unloading cargoes of copra in Copenhagen from three different ships. The eruption began one to two days after contact, with redness and itching, at first on the hands and face, but later spreading rapidly all over the body. In some cases there was fever, and several lymphatic glands were enlarged. In one case a workman handling the cargo apparently conveyed the infection to members of his family at home. The acarid-like parasite which was found in the copra is considered by the author to be identical with *Tyroglyphus longior* var. *Castellani*.

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the matter of telephones. The bitterness of State control was never more acutely brought home to the public than by the sudden introduction by the bureaucracy that have had handed over to them the control of the telephone service. We are told that they can legislate as they please, quite independent of Cabinet and Parliament, and they have proceeded to do so. Their contention is that as charged for at present a large sum has to be drawn from the national funds to cover the loss entailed to the department, so to cover this loss they have to raise the price to users. The public have an answer to the effect that were the price lowered upon the present rate the number of telephones in use might be quadrupled and the income of the department sufficiently increased to more than pay its way, but also to add a sum to the revenue.

The method of curing this financial evil by the Postmaster-General is a short-sighted one in the opinion of the business men of the nation. It is, however, the usual armchair governmental way: raise the price, and if a large number of the public give up their telephones the price will be further raised and yet further until the telephone service is reduced to a minimum and only possible to be used for Government service. Before the Government took over the working of the services from the private companies a handsome dividend was paid, but the moment the Government took up the control profits disappeared and the public had to pay for the loss by taxes. Incapacity on the part of officials is the only word that explains the situation, and it would seem that is the rule when any service is taken over by the State—more expenses and lessened income and the public deprived of a safe investment for their money. We found the same thing when the telegraph service was acquired by the Government from the control of the several companies that created, organized and worked the telegraph system when first brought into being. The manner of the acquisition of the telegraph system is forgotten now, but it is a tale but too often repeated in history. It seems that the Government of the day had resolved to acquire by purchase from the several companies—some large, some small—that managed and had possession of the telegraph instalments of the country. The then head of the Postal service—a Cabinet Minister—was concerned in the acquisition and handled the matter in a business fashion to his own detriment. The matter was being dealt with by Parliament; the Cabinet was prepared to pay a certain sum involving some millions of money. The Postmaster-General at the time—Mr. Scudamore—was in touch with the heads of the private telegraph companies, and whilst yet the matter was being discussed by Parliament he secured the taking over of the telegraph system during an interview at a price which saved the country over a million of money. The result was, because he had done so privately and to the benefit of the nation, he was dismissed his appointment, and we find him next in a "job" at Constantinople, so that he was safely out of the

THE JOURNAL OF Tropical Medicine and Hygiene

JANUARY 15, 1921.

THE DOCTOR'S MEANS OF COMMUNICATION IN THE TROPICS.

It is to be hoped that our medical brethren in the tropics are not being, or likely to be, treated in the same way as we unfortunates at home over

way. The public were saved paying over a million pounds extra, but the man who did so was punished by exile.

In the Crown colonies and protectorates all matters of this kind are really under Government control, and the public, although they have a say in the matter, have practically no power. The representatives of the public have power to elect members to sit on the legislative council of their colony and thereby have a say; but as the council is constituted they have no power, for the council has a majority of Government officials on it and able to control any measure that is offensive to Governmental ideas. How often on these legislative councils do we find all the Government officials voting one way, and all the members elected by the public voting the other? The public representatives are allowed to have their *say*, but no *power* to make their wishes effective. It may be for the good of the community that this method of conducting the affairs of the colony is the better, but it is a Gilbertian form of government which lends itself to burlesque. A wise monarchy or autocracy is always held up to us as the ideal form of government and perhaps it is, but the opposite frequently obtains and then trouble begins and chaos prevails.

Upon the rapidity of the communications of a nation as a community does its welfare largely depend; and in medical matters especially upon the rapidity with which the doctor can be called and with which he can reach his destination does the chances of the patient's recovery in many instances depend. The telephone is the most rapid and most simple of all media of communication. It is the most efficient also. Telegrams may be misunderstood; a mistake on the part of the transmitter may confuse, or so alter meanings that the very opposite impression is conveyed to that which the sender intended. But when the sender and the receiver are placed in communication by speech, with no intermediary, then all should be well. In the Crown colonies and protectorates communications vary according to circumstances. How news in the desert is carried by natives has long been a marvel, and to-day it is not quite apparent. At times it beats in its rapidity even the telegraph, and we might learn a lesson were we to study the methods of the African or other savage tribes more closely. In a district where there are no railways, no telegraphs, no roads, no horses, mules or donkeys the means of communication are reduced to walking, but the walk may extend to several hundred of miles before the patient can be reached by the doctor; this means an expedition really equipped with food, carriers, tent and all the impedimenta of a military march through a desert, or it may be a hostile people. In the Sudan, for instance, there are several provinces—such, for instance, as in Mongalla—where there are no railways, no horses, mules or donkeys, as they cannot live owing to tsetse-fly disease; no roads even so that motors are impossible, and owing to the configuration of the country the motors cannot run as they have been

known to do across a flat sandy desert. There are no telegraphs, for even allowing that the wires are respected and not destroyed by the natives, who is to receive the messages in the outlying parts of the province? To accomplish that would necessitate a telegraph station or several such stations with a resident European. He would want protection possibly from marauders by troops. How are these men to be fed—no roads, no horses, &c.? And in case of illness no doctor, or it may be no messenger to send to summon the doctor at the military or administrative headquarters where he resides.

But surely there must be some means of communication other than by walking available. What are they? Bicycles cannot be used for there are no roads, in many instances not even footpaths; carrier pigeons might conceivably be utilized, but they cannot bring the doctor, they can only, if they were available, announce the fact that the doctor is required; he has to get there on his feet, and after a considerable interval, an interval it may be of days, when it is too late.

By wireless; but that only carries messages, and moreover it implies a wireless station, an apparatus, an operator, and all the paraphernalia of a dwelling, an impossibility in the way of expense. By aeroplane; this affords a plan by which the doctor can travel from the headquarters, but it does not hasten the transmission from the outlying station to the headquarters. By boat; if a river of sufficient size or a canal is available this is feasible and the most speedy, especially if a motor-boat is to hand, and practical of all measures. But there may be no river available; there are few tributaries of the Nile, so that when a cross-country station district has to be reached there is nothing but a journey on foot whereby to get there.

Take another country—China—as an illustration. Up to a few years ago, away from the China coast there were no trains, no roads, nothing but footpaths that served as a means of progression by being carried on men's shoulders in a chair or on a wheel-barrow. Slow progression at best, and the busy practitioner in the large adjacent city to reach his patient, say, even a hundred miles, will spend the better part of a week going and coming. Telegraphs in China are multiplying no doubt, but they are a mere trifle in view of the enormous distances in that country where distances are spoken of in hundreds and thousands of miles.

The newest telegraph can be utilized, however, and the patient and doctor can be brought into contact at times. The writer had an instance of the kind. An out-station of the Eastern Extension Telegraph Service is stationed at Cape St. James, in the China Sea. It is an isolated spot, some 800 miles south of Hongkong. Here was established the telegraph operator with his wife and children. He telegraphed to Hongkong that his wife, his two children and himself were all suffering from malaria fever, and asked the doctor in Hongkong what should he do? He had no relief there; that is, he had no assistant to receive or send messages, and that the servants were all ill as well. A trying and

miserable state of affairs, for being without a cook there was no one to even prepare the simplest of foods. Each had to be dealt with in turn; first, how to treat his wife, then each child dealt with as regards symptoms and treatment according to age, and then himself. The natural questions for the doctor to inquire about were: the nature of the febrile attacks, the drugs available. He had then to get his medicine box and give an account of the drugs it contained, then the dosage to suit each patient, and what drink and food is required.

These are examples of the doctor's difficulties in different parts of the world. At home, if doctors' telephones are to cost them double and more than the already high rates, it may exceed what they can afford to pay and necessitate their giving their telephones up—a loss to his practice and income, and from the humanitarian point of view, cruelty to the sick and injured. If any section of the community have a just reason for appeal against what the business men call a monstrous injustice to them and to the nation's trade, surely the doctors have a prior claim for so doing. In the Crown colonies the doctors in civil practice must speak early and put their claims before their local governments. Illnesses are sudden in their development and more rapid in the tropics, and the loss or even diminution in communication threatens to cause serious evils to the community.

Annotations.

Das Venerische Granulom (W. H. Hoffman, *Muench. Med. Woch.*, vol. lxvii, No. 6, February 6, 1920).—The author of this interesting paper is of the opinion that granuloma venereum is a strictly sexual disease. It affects both sexes, and whites may become infected as the result of intercourse with black women. The disease begins on the sexual organs, in men the penis or glans, in women the vulva, later spreading to the neighbouring parts, such as the groin, scrotum, thighs, and perineum. In women the ulceration may invade the vagina and extend into the rectum. The lymphatic glands in the groin are enlarged. The ulceration after a time scars in the centre while spreading actively at the edges.

The author considers that the causative organism is a capsulated bacterium, forming the "round bodies" which have been described in the disease. These bodies are found in very large numbers enclosed in connective tissue cells. The bacterium is Gram-negative. Giemsa stains the bacterium a dark violet to black red, the capsule a light pink. The parasite occurs as a double coccus or a rod with deeper coloration at the ends than at the centre, so that they have somewhat the shape of dumb-bells. The parasites penetrate the cell and multiply within it, pushing aside the nucleus, and in some cases the cell bursts, and the parasite may thus be set free.

The organism has been grown on many media, agar, maltose agar, &c., but the capsule may be lost. The colonies in maltose are at first yellowish-white, but later become of a dark chocolate colour. The germ produces gas in glucose and lactose, but does not liquefy gelatine. Milk is rendered acid in twenty-four hours. As regards treatment, the author recommends X-rays and intravenous injections of sterilized solution of 1/1000 tartar emetic in doses of 60 to 120 c.c.

Eczéma de la Laque (M. Chazarain-Wetzel, *Rev. Med. et d'Hyg. Trop.*, vol. ii, Nos. 3-4, 1914-1919).—A description is given by the author of a case of dermatitis which was the result of the patient having gathered wood in a forest where the lac tree *Rhus semialata* grew. Contact with the tree was denied by the patient, who on his return home was affected by a general itching and œdema of the face, and later of an eruption of vesicles on the nose and ears. The inflammation subsided after the administration of an aperient and application of zinc ointment. In ten days the patient had completely recovered.

Ivy and Sumac Poisoning (E. A. Sweet, Surgeon, Public Health Service, and Dr. C. V. Grant, U.S. Department of Agriculture, *Public Health Reports*, vol. xxxv, No. 9).—The fact that certain species of plants belonging to the *Rhus* or *Sumac* family exert a poisonous action upon the skin of persons susceptible to their influence has long been a matter of general recognition. Inasmuch as the poisonous growths possessing this characteristic thrive in America, and are especially prolific in certain sections of the country. The author considers it desirable from a health standpoint to bring together the general information on this subject, in order that the public may become better acquainted with the nature of these plants, methods by which they may be recognized, and the various means of preventing their toxic effects. The sum total of the incapacity and economic loss arising from this cause can scarcely be estimated, to say nothing of the bodily discomfort which commonly ensues, but certainly they are sufficient to justify a more widespread knowledge of the practical aspects of the *rhus* problem.

Description of the Plants.—The native forms of *rhus* which produce skin eruptions belong to several species distinct botanically, including vines and shrubs known as poison ivy and poison oak, and also the poison sumac shrub or tree. Despite their variety of form these plants are closely related, and possess certain prominent peculiarities by which they can usually be distinguished without difficulty, so that by acquiring some slight knowledge of the characteristic appearance of their leaves, fruit, winter buds, and of their growth, one may readily avoid them at all seasons of the year.

Poison Ivy and Poison Oak.—Poison ivy and poison oak occur as woody perennial vines or as low erect plants, or trailing shrubs, and are most readily

distinguished by their leaves, which are always divided into three leaflets, and by their smooth, whitish, waxy fruits, which resemble mistletoe berries in appearance, but vary in size from $\frac{1}{4}$ to $\frac{1}{2}$ of an inch in diameter, and contain a single stony seed. Of the various names applied to these plants in different localities the commonest are poison ivy, poison oak, mercury, ptery, climbing or trailing sumac, and poison vine. For purposes of recognition and consideration with respect to their poisonous properties, the several botanical species may be included under one general description, although great variations in character of growth and in the forms of the leaflets are found, in many instances even on individual plants.

While the names poison oak and poison ivy are used interchangeably, the term poison oak is often restricted to plants with an erect or bushlike habit of growth and with leaflets resembling certain types of oak foliage. Thus the plant generally known as poison oak throughout the Pacific Coast region, from Lower California and Arizona to Canada, occurs as a bush, sometimes attaining a height of 4 ft. or 5 ft., and has leaflets resembling leaves of the western oaks, but it is also found growing as a vine, and is sometimes called poison ivy. In the East, from New Jersey, Delaware, and Virginia, south and south westward, the name of poison oak is often used to distinguish from the poison vine, a form growing as a bush, with lobed leaflets somewhat suggestive of leaves of scrub oak; while westward from Minnesota, Nebraska and Arkansas, to Washington, Montana, Colorado and New Mexico, this name is applied to a low bush or trailing shrub form which does not climb.

Familiarity with any one of the forms will enable even the careless observer to recognize poison ivy or poison oak wherever encountered, whether as a vine, trailing shrub or bush, or at least to avoid readily all plants bearing suspicious resemblance to it. The vines attach themselves to trees, walls, fences, rocks, or any adjacent support by means of aerial rootlets, and are without the twining tendrils found on many climbers. They sometimes climb to the tops of the highest trees, and are occasionally found with stems 3 in. or 4 in. in diameter. The forms growing erect as bushes, or shrubs with trailing underground roots, usually attain a height of a few inches to about 3 ft., but in favourable situations are often found as bushes of luxuriant growth 4 ft. or 5 ft. high. The leaves of all forms have stout, rather long stems, bearing three leaflets, two of which are opposite and short-stalked, while the third or terminal leaflet is long stalked. The leaflets are from 1 in. to 4 in. long, dark green on the upper surface, lighter, sometimes with a velvety covering of fine hairs underneath, with smooth or more or less indented margins, and of variable forms. The tendency of the leaflets to form irregular, notched, and indented margins is an aid to the identification of the plants; and in forms with generally smooth margins, a deep notch or several indentations on one side of the leaflets are characteristic, which

often serve to confirm the identification. Small, inconspicuous, yellowish-green flowers, borne in loose branching clusters about 1 in. to 3 in. long, growing out of the angles between leaf stalks and plant stem or above scars along the sides of the branches, appear in early summer, and are followed by the small, globular, smooth, green fruits which become white or ivory colour as they ripen. These waxy fruits, which remain on the plants until late in the winter, are about a quarter of an inch in diameter in the commoner forms. They are globular in shape, sometimes flattened or lopsided, and with the advance of the season have a tendency to dry and wrinkle; often losing their thin outer coating and revealing the single deeply grooved stone which they contain.

Poison ivy or poison oak is found in fields, pastures, woodlands, and thickets, along roadways, and streams, often also in city parks, cemeteries, and suburbs, sometimes mixed with other shrubbery in such a manner as to escape observation until attention is attracted to it by the occurrence of cases of poisoning. It adapts itself to the greatest variety of conditions, spreading through deep hollows and ravines, flourishing in dry soil and on hillsides, often spreading by underground roots, from which small, erect shrubs arise, and showing the tendency to ascend trees or any support encountered in its growth. Its highly attractive foliage, which is red when the young leaves first unfold, becoming green with the advance of the mild weather, and turning in autumn to beautiful shades of scarlet and orange, has led to its being preserved to some extent as an ornamental vine or shrub, and at times to the collection of its foliage by persons ignorant of its identity and injurious properties. Many cases of poisoning result in this way.

The fragrant, or sweet-scented, sumac and the ill-scented sumac are *Rhus* shrubs with trifoliate leaves, resembling forms of poison ivy so closely that they may not be readily distinguished in some instances. Both differ from the poisonous *Rhus* species in their flowers, which appear in dense spikes before the leaves, and in their red fruit; they also differ in the aromatic properties indicated by their names. The fragrant sumac is found in rocky woods from Canada to Florida, and westward as far as Minnesota, Kansas, and Louisiana, while the "skunk bush" occurs from Illinois and Texas westward to Washington and California, growing in dry soil.

Some Salient Facts regarding the Toxicity of Arsphenamin and Neo-Arsphenamin (G. B. Roth, *Arch. of Derm. and Syph.*, 1920, p. 292).—From the results of experiment made the following conclusions are arrived at:—

(1) Neo-arsphenamin behaves differently in the animal organism from arsphenamin and should not be regarded simply as arsphenamin in a convenient form for administration.

(2) When administered intravenously and at a con-

stant rate, acid solutions of arsphenamin are much more toxic than the corresponding alkaline solutions, the toxicity of the acid solutions increasing with the concentration.

(3) A properly alkalized 2 per cent. arsphenamin solution when administered intravenously and in high dosage is slightly more toxic than a 0.5 per cent. solution.

(4) The toxicity of properly alkalized arsphenamin increases greatly as the rate of its intravenous administration is increased. Rate of administration is, therefore, an important factor in determining toxicity.

(5) When neo-arsphenamin is found to dissolve with comparative difficulty, it is generally highly toxic and should be discarded.

(6) Shaking aqueous solutions of neo-arsphenamin or alkalized arsphenamin in the presence of air increases their toxicity markedly. When a 4 per cent. solution of neo-arsphenamin is shaken violently for ten minutes its toxicity is more than quadrupled.

Observations on Subacute Infective Endocarditis (T. F. Cotton, *British Medical Journal*, No. 3127, December, 1920.)—In the author's experience, subacute infective endocarditis is not a rare disease. It is seen in 8 per cent. of patients with signs of gross valvular disease attending a special heart clinic. In the diagnosis chief reliance should be placed on the following signs: Gross valvular disease, pallor, enlarged spleen, and clubbing of the finger-tips.

Aortic regurgitation is the type of valvular disease usually seen in this disease; it is rare to find the mitral valve alone involved.

The course of the disease from the onset of symptoms is usually less than fourteen months; death may occur within two months of the onset of the symptoms.

A bacteriological examination of the blood is useful in confirming the diagnosis.

The disease is always fatal.

On the Action of Tartrate of Antimony in Intravenous Injections (J. B. Christopherson, C.B.E., M.D., F.R.C.P., F.R.C.S., *British Medical Journal*, No. 3127, December, 1920.)—The author, judging from direct experiments *in vitro* with antimony tartrate, and from clinical results, arrives at the conclusion that antimony tartrate has a profound and direct specific effect on bilharzia in all its stages. It kills the parent worm *in situ* in the portal tributaries. It penetrates the ova as they lie deposited in the tissue wall and kills the enclosed embryo. It has also the power of killing the free miracidium.

A Study of Mercury Injections by Means of the Roentgen Ray (H. N. Cole, M.D., Sydney Littmann, M.D., and Torald Sollmann, M.D., *Journal of the American Medical Association*, vol. lxxv, No. 23, December, 1920.)—The authors come to the following conclusions:—

1. The absorption of insoluble mercury preparations

from intramuscular injections can be followed admirably by Roentgen ray shadows. The method is not applicable to soluble preparations.

2. An extensive study of clinical cases gave the following as the time when absorption is completed:

Mercuric salicylate: By gluteal muscles, mean, 4 days; extremes, 4 to 10 days. By lumbar muscles, mean 8½ days; extremes, 2 to beyond 24 days.

Calomel: Mean, 15 days; extremes, 4 to 39 days.

Gray Oil: Unabsorbed during entire period of observation, a mean of 43 days; extremes of 16 to 125 days.

3. These findings indicate that gray oil injections are both inefficient and dangerous, and their use should be abandoned.

Calomel injections are also dangerous.

Mercuric salicylate injections, especially into the gluteal muscles, give a satisfactory absorption and present relatively little danger.

The authors have recently seen a case of poisoning from gray oil injections in which Roentgen-ray examination revealed large masses of metallic mercury globules.

Abstracts.

A SPECIES OF RHYNCHOPORUS AS HUMAN INTESTINAL PARASITE.

By C. SIVASITHAMPARAM, L.R.C.P., L.R.C.S., &c.,
D.M.O. Badulla.

THIS case was brought to my notice about eighteen months ago when I was on leave in Jaffna, and I report it specially as it is a very rare and interesting case, and to invite discussion on the subject.

The history of the case according to the mother was as follows:—Patient T. V., male, aged 4 years, of respectable Jaffna Tamil family. Since birth the child was in indifferent health with derangement of the bowels, and when it was 1½ years old beetles were observed in the child's stools, and they continue up to date. On careful observation it was found that the passage of beetles in stools was paroxysmal, preceded by definite symptoms. Two or three days previous to an attack the child becomes inactive, drowsy, eats badly, and sleepless at nights, tossing about in bed with abdominal pain. On the morning after a sleepless night frequent evacuation of bowels begins with expulsion of a large number of black beetles in the first motion, the number becoming less and less numerous in the succeeding ones, the diarrhoea stopping spontaneously in two or three days. The beetles are said to move about trying to extricate themselves from the faecal matter, crawl about, and when sufficiently dry fly off, some dying in the attempt.

After some expulsion of beetles the child becomes more lively and eats better, but is pale and indifferent

Abstracted from the *Journal of the Ceylon Branch of the British Medical Association*.

in health until the next attack. These attacks are said to come on irregularly, sometimes once a month and sometimes twice, or none for two or three months. At the time of my last visit the child appeared to be in good health in spite of the continuation of the above symptoms which have now become few and far between. No systematic treatment was adopted except an occasional dose of santonin or other native remedies.

Family History.—Parents healthy. This was the fourth and surviving child of the family, the three elder ones having died between 2 and 3 years of age with similar symptoms as this child suffered from, but no beetles were observed in their stools. In every case death was preceded by convulsions.

Unfortunately my investigation of the case was limited to a short conversation with the mother when the above history was elicited. Nothing material could be obtained from the appearance of the child, who was far from healthy, with a certain amount of anæmia. I had to return to my station with a request to send me some of the beetles by post when the child passed them the next time. One was accordingly sent to me, which I forward, with a drawing of it for inspection. I am indebted to Rev. Father C. Reichard, S. J. Principal of St. Michael's College, Batticaloa, who was kind enough to do the drawing for me.

Nothing was heard of this case until last month when I again happened to be in Jaffna on leave. I paid a visit to the child and found him much improved in health and the mother told me that he had not passed beetles for a long time. However, I secured a specimen of his stools for examination under the microscope. While preparing the film I found a live beetle embedded in the faeces. On examination under the microscope there was a remarkable freedom from ova of the usual intestinal parasites. But under a $\frac{3}{8}$ inch objective embryo-like objects with distinct alimentary canals were found.

I may here mention that I had heard of a similar case when I was stationed at Mihintale about 12 years ago. In a village called Kardy-Kulama a child was said to pass beetles in stools which the Sinhalese Vedaralas called "Kurumini-Mandama." Investigation of the case was not possible owing to my transfer from the station soon after.

A NOTE ON THE VALUE OF OIL OF CHENOPODIUM IN THE TREATMENT OF STRONGYLOIDES INFECTION.¹

By H. HASTINGS WILLIS, B.Sc., M.B., Ch.M.

In the course of the work of Unit No. 4 of the Hookworm Campaign in the Lower Burdekin area, it was noted that in several patients treated for hookworm infection who harboured *Strongyloides stercoralis* in addition, the latter infection disappeared after two doses of chenopodium, even though further doses were necessary to rid the

patient of the worms for which the treatment had been undertaken. An unusually high incidence of strongyloides infection in a small locality adjacent to Townsville has given an opportunity of testing the efficiency of this drug on a larger scale.

Of 223 persons in this small area who were examined for hookworms, sixty were found to be harbouring strongyloides. This diagnosis was made by finding in the stools larvæ with a definite genital rudiment visible with low power magnification (100), the characteristic so-called double pharynx, and a relatively shallow mouth capsule. The last character was regarded as the best criterion in distinguishing between strongyloides and hookworm larva, but in the majority of cases it was not necessary to make this rather tedious observation. As a further check on the accuracy of the diagnosis, some specimens were kept at room temperature under moist conditions for a number of days, when free-living adults were seen together with their eggs and, in some cases, their filariform larvæ.

Inquiry from the patients or their parents failed to elicit a history of any symptoms which could be referable to this infection. With the exception of one mentally defective child, all were apparently in good health. The treatment consisted of the administration of oil of chenopodium—0.06 mil. for each year of age up to 20 years and 1.5 mils. for adults—given as a single dose on an empty stomach, and followed in one hour by a purgative dose of magnesium sulphate. Preliminary purgation was not deemed necessary. Fifty-eight persons were treated. This treatment was repeated after seven days, the same dose being given.

Fourteen days after the second treatment faecal specimens were collected and examined both by plain smear and by the centrifuge method, but no eggs or larvæ were found. It was surmised that the patients had been cured, but in view of the opinion held by many that this infection is an intractable one and that negative results of examination after treatment may be due to a suspension of the egg-laying function of the worms, it was decided to make a re-examination later. This was done after four weeks, i.e., six weeks after the administration of the second treatment; the results were still negative. In view of the possibilities of reinfection after cure, it was felt that further re-examinations could have little value.

CONCLUSION.

Oil of chenopodium is an efficient vermifuge for *Strongyloides stercoralis*.

Medical News.

In addition to the regular quarantine officers at the various ports in the United States, the U.S. Public Health Service is now maintaining a number of experienced quarantine officers in various points in Europe.

¹ Abstracted from the *Medical Journal of Australia*, vol. xi, No. 16, October, 1920.

MEMORIAL TO THE LATE DR. A. J. CHALMERS OF KHARTOUM.

THE late Dr. A. J. Chalmers, the well known authority on tropical diseases, and joint author with Dr. Castellani of "Tropical Medicine," whose sudden death on his way home on leave in April last shocked the profession and his numerous friends, left a splendid collection of medical books mainly on tropical diseases, and including some almost priceless incunabula.

The whole of these, with the exception of a certain number presented to the Royal College of Physicians, have been presented by Mrs. Chalmers to the Royal Society of Medicine.

The Society has wisely decided that the collection shall be kept together and be known as the "Chalmers Collection," and now we are informed that Mrs. Chalmers has presented the Society with the sum of £500 for the shelving and furnishing of a room in which the books will be kept as a memorial of her husband. It is hoped that the collection of books on Tropical Medicine will be added to from time to time, and the room chosen for the Chalmers Library is well adapted for the purpose.

This happily coincides with the reconstruction of the new Section of Tropical Medicine and Parasitology. The Section was formed in 1912, but was suspended during the War, and has only this session been formally constituted, and among the first nominated officers are Lieut. Colonel Sir Leonard Rogers, as President; and as Vice-Presidents, Prof. Leonard S. Dudgeon, Lieut.-General Sir John Goodwin, Vice-Admiral Sir Robert Hill, and Prof. G. H. F. Nuttall.

Sir Leonard Rogers recently presided over the first meeting of the new Section, when a very interesting programme was provided, and we are now able to congratulate it on having been able to start with a library of its own, probably the finest collection of books on Tropical Medicine to be found anywhere.

LONDON SCHOOL OF TROPICAL MEDICINE.

EXAMINATION RESULT. 64TH SESSION. OCTOBER-DECEMBER, 1920.

With Distinction.—Buxton, P. A., M.R.C.S., L.R.C.P., "Duncan" Medal; Parker, H. B., Surgeon Lieutenant-Commander R.N., M.B., B.S., M.R.C.S., L.R.C.P.; Wiltshire, H. G., M.B., M.R.C.S., L.R.C.P.; Hermitte, L. C. D., M.B., Ch.B.; Cullen, W. B. (Major I.M.S.), M.D.; Heppenstall, C. (Captain I.M.S.), M.B., B.S.; Liscombe, R. H., M.B., B.S., M.R.C.S., L.R.C.P.; Flowerdew, R. E. (Captain I.M.S.), M.B., Ch.B.

Passed.—Bose, S. C., M.B.; Kellersberger, E. R., M.D. (Washington); Allen, G. V., M.B., B.Ch., B.A.O., East African Medical Service; Denham, A. A., M.B., Ch.B.; Haji, H. S. (Captain I.M.S.), M.R.C.S., L.R.C.P., L.M. and S. (Bombay); Paranjpe, A. S., M.B., Ch.B., L.R.C.P. and S., M.D. (Heidelberg); Gupta, A. Das., M.B. (Cal.); Caddick, C. J., F.R.C.S., M.B., D.P.H.; Khaled, Z., D.M. (Cairo), Cairo Public Health Service; Liang, P. T., M.R.C.S., L.R.C.P.; Patel, A. H., M.B., B.S. (Bombay); Taylor, W. R., M.R.C.S., L.R.C.P., D.P.H.; Maya Das, F., M.B.,

Ch.B.; Somasundram, S., M.R.C.S., L.R.C.P., Ceylon Medical Service; Silva, W. E. de, L.R.C.P. and S., L.F.P.S., L.M.S. (Ceylon), Ceylon Medical Service; Jacques, F. V., M.B., Ch.B., Federated Malay States Medical Service; Salter, Miss E. B., M.B., Ch.B., Federated Malay States Medical Service; Kirdany, A. M., D.M. (Cairo), M.R.C.S., L.R.C.P., Cairo Public Health Service; Hooker, A. W., M.B., B.S., M.R.C.S., L.R.C.P., Wesleyan Missionary Society; Lombard, Miss E., Swiss Government Diploma; Moilliet, A. K., M.D., C.M. (Dalhousie); Gore, Miss M., L.C.P. and S. (India), L.M. (Rotunda); Mehta, A. R., M.B., B.S.; Stenis, O. van, M.D. (Caracas), Gore, Miss A., L.C.P. and S. (India), L.M. (Rotunda); McCleery, J. M., M.D., B.Sc. (U.S.A.), Egyptian Sudan Mission; D'Abreu, Miss D. G., M.R.C.S., L.R.C.P., D.P.H.; Abbassi, A. F., M.B., Ch.B.; Palmer, E. S., M.B., C.M.; Ponniah, K., L.R.C.P. and S., L.R.F.P. and S., L.M., L.M.S. (Madras); Parnanand, L. M. S. (Punjab), D.P.H. (Lond.); Westmorland, A. S., M.R.C.S., L.R.C.P.; Saravanamuttu, E. T., M.R.C.S., L.R.C.P.

At the London School of Tropical Medicine on December 17, 1920, a laboratory demonstration meeting of the Royal Society of Tropical Medicine was held. There was a large attendance, and the following demonstrations, amongst others, were given:—

Col. S. P. James, I.M.S., "Specimens illustrating Indigenous Malaria in England."

Surg. Rear-Admiral P. W. Bassett-Smith, C.B., C.M.G., "Trypanosome Infection of Fœtus."

Dr. A. C. Stevenson, "Extravascular Distribution of Trypanosomes in Tissues."

Sir James Cantlie, K.B.E., F.R.C.S., showed a case for diagnosis from Mesopotamia, "Baghdad sore" or "mycosis" on finger.

Lieut.-Col. G. E. F. Stammers, R.A.M.C., "Spirochætal Jaundice in the Guinea-pig."

Major H. C. Brown, C.I.E., I.M.S., "Standardization of Bacterial Suspensions by Opacity."

Dr. Andrew Balfour, C.B., C.M.G., "Models of Fruits and Foodstuffs from India."

Dr. P. Manson-Bahr, D.S.O., "Two Cases of Liver Abscess and various Pathological Specimens."

Lieut.-Col. A. Alcock, C.I.E., F.R.S., "Some Arthropods of Medical Interest."

Dr. J. G. Thomson, "Various Preparations demonstrating Leishmania Infections."

Professor R. T. Leiper, "Helminthological Preparations."

Dr. G. C. Low, "Human Blood Filaria."

Dr. E. Atkin and Mr. A. Bacot, "Rickettsia of Typhus and Trench Fever."

Col. Clayton Lane, I.M.S., "Demonstration of Levitation Method for Concentration of Ankylostome Eggs."

Sir Stewart Stockman, "Piroplasmosis of Domestic Animals."

Mr. J. T. Edwards, M.R.C.V.S., "Pathological Specimens of Veterinary Interest."

Dr. A. Castellani, C.M.G., "Some Tropical Mycoses."

Original Communications.

MITES AS INTERNAL PARASITES OF MAN.

By W. E. CARNEGIE DICKSON, M.D., B.Sc., F.R.C.P.E.

VARIOUS mites have been described as occasional internal parasites in man, but most of the cases are not very well authenticated. Fantham, Stephens and Theobald, in their translation and extension of Braun's "Animal Parasites of Man," 1916, p. 491, after stating that certain mites live endoparasitically in fowls, seals, &c., say that "it is therefore not improbable that endoparasitic mites are found in man; but no definite discovery has yet been made." One definite case is described by Castellani, where mites (*Cytolichus hominis* Hirst) were found in the omentum of a negro. The following preliminary note on two cases of infection of the urinary tract by mites may be of interest, the parasites being present in large numbers in very carefully taken catheter specimens of urine.

The first of these was a young adult unmarried woman, who had suffered for many years from symptoms variously interpreted by the many doctors whom she had consulted as "chronic Bright's disease," "cystitis," &c. In April, 1915, she consulted Dr. R. Murray Leslie, who sent a specimen of the urine to me for examination. It contained a small amount of albumin, occasional hyaline casts, and very large numbers of surface epithelial cells, many of them in little sheets and groups, apparently from the bladder, and only a very few pus cells. Nothing else of any note was detected. The symptoms continued in spite of treatment, the chief of these being frequency of micturition and constant irritation. Another specimen was examined some three weeks later, with much the same result, except that the masses of epithelium were larger, and made one speculate on the possibility of their being fragments of some neoplasm of the urinary tract. With this in view, I centrifugalized the whole of the rest of the specimen, and examined the deposit for further epithelial masses, and, whilst doing so, I happened upon an oval, clear-shelled body, which strongly suggested to my mind a small parasitic ovum. On continuing the search I found three adult female mites, a larval form, and several more ova. The structure and characters of the mites were much obscured by the debris and cells of the centrifugalized deposit amongst which they lay. At first sight I took them to be itch-mites, and I thought that they might have been washed into the urine from the pudenda, and that the irritation of which the patient complained might possibly be of the nature of a *Sarcoptes* infection of the external genitals. An examination of the patient by Dr. Murray Leslie gave no confirmation of this supposition, and he therefore sent me a carefully taken catheter specimen of the urine, in which I found five mites and several ova. The examination of these at once showed that they were not *Sarcoptes scabiei*. As I was not learned in the subject of mite identification, I looked up the

literature and tried to make out the species of the mites from Banks' "Treatise on the Acarina or Mites," but I speedily came to the conclusion that it was a matter for an expert zoologist.

Before sending the specimens to Professor Ashworth for this purpose, and in order to make absolutely certain that the parasites actually came from the bladder, I asked Mr. Thomson Walker to cystoscope the case and catheterize the patient. The trigone of the bladder showed a curious condition—a large number of closely aggregated little raised hemispherical pinkish elevations, with an occasional detached elevation at the edges of the patch—the whole rather suggestive of grains of boiled tapioca of a pinkish colour. More mites were found in the catheter specimen taken from the bladder at this examination, but not in the urine from the ureteral catheterization of both kidneys. After a prolonged course of treatment by Mr. Thomson Walker and Dr. Murray Leslie, which will be detailed when a full account of the case is published, the conditions gradually improved, and repeated examinations, over a dozen in number, failed to show the presence of any mites or ova.

The mite was identified for me by Dr. Ashworth as *Tyroglyphus (Aleuribius) farinæ* De Geer, found usually in flour, grain, stored foods, &c. His diagnosis was based on the characters given by Banks, and he notes that this species has been much confused with *Tyroglyphus siro*, the common cheese-mite, which is recorded from faeces and urine, but often regarded as merely a contamination. In the present case, a few examinations of the faeces gave a negative finding. The blood was not examined.

My second case was that of a well-known public man, of middle age, who was sent to me by Dr. Theodore Drysdale in July, 1919. The patient was suffering from a progressive general glandular enlargement, the spleen being also enlarged, firm, and palpable about an inch below the costal margin. The liver was not palpable, and to percussion its lower margin was about an inch below the costal margin in the right nipple-line. The patient was very emaciated.

There were considerable numbers of firm mobile glands in both axillæ about the size of beans, and similar glands were present above the clavicles and in the groins. The condition was suggestive of lymphadenoma or lymphatic leukaemia, and I therefore examined the blood, with the following result:—

Red blood corpuscles	...	...	3,930,000 per c.mm.
White blood cells	...	...	22,500 "
Hæmoglobin (Oliver and v. Fleischl)	...	...	55 per cent.
Colour-index	...	...	0.71

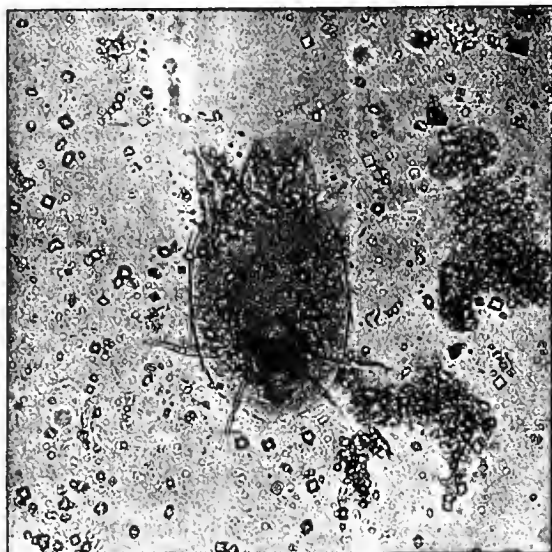
The differential leucocyte count was as follows:—

Mature polymorphs	...	77.40	...	78.34 per cent.
Immature polymorphs	...	40.94	...	"
Intermediate myelocytes	...	0.27	...	2.70 "
Ordinary myelocytes	...	2.43	...	"
Large lymphocytes	...	4.14	...	17.34 "
Small lymphocytes	...	13.20	...	"
Large mononuclears	...	...	...	0.88 "
Eosinophils	...	...	...	0.60 "
Mast cells	...	...	...	0.14 "

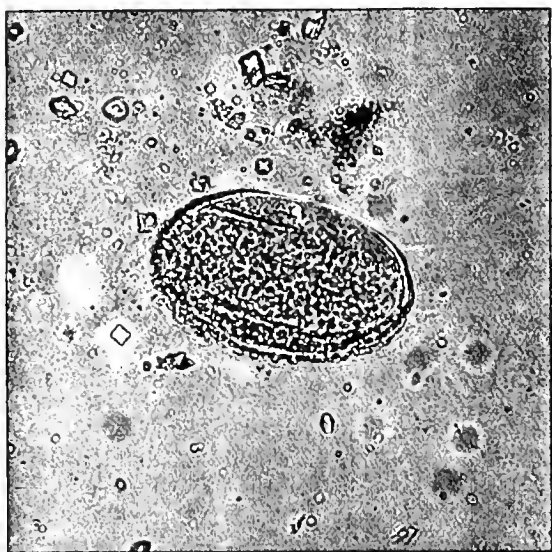
The red corpuscles showed considerable aniso-

cytosis, with a minor degree of poikilocytosis. No nucleated forms, or reds showing basophilia, either punctate or diffuse, were seen while counting 1,000 leucocytes and examining five large films.

This count was somewhat suggestive of a mild degree of, or possibly a remission in, a mixed



Tarsonemus sp. ? Adult Female. $\times 200$.



Tarsonemus ovum. $\times 400$.

leucocythæmia, but the problem arose, when the mite infection described below was detected, as to whether it played some, or even the chief, part in the causation of the lymphatic and blood condition. I can find nothing in the literature to throw any light on the question.

On general principles, I asked the patient to pass a specimen of urine into a sterile urine-glass, after carefully washing the glans, which he did in my

presence, the first ounce or so being rejected. The general examination of this specimen did not bring out any point of note, but the centrifugalized deposit, which was semi-translucent and mucoid, with an opaque layer of oxalates at the bottom, showed, in a fresh wet film, a small oval body with a clear shell, so similar to the mite ova found in the previous case, that I centrifugalized the rest of the specimen and examined the whole deposit. In this I found two adult female mites, one immature mite, two cast cuticles, a mite in profile (stage indeterminable), and two ova. Numerous large masses of epithelial cells were also present, of much the same characters as in the previous case, and which might have suggested the possibility of their being fragments of tumour had the mites not been found as a probable explanation of their presence. Some large cells were a little suggestive of immature ovarian ova. They were much smaller than the mature ova found, and may quite possibly have been merely altered and swollen epithelial cells.

The fæces were examined on several occasions, but always with a negative result as regards the presence of mites. The patient suffered also from severe pyorrhœa, and had the affected teeth removed soon after my examination.

In order to confirm the supposition that the mites were true endoparasites, Mr. Thomson Walker, at my suggestion, catheterized the patient, collecting the urine separately from the bladder, and then from each ureter. In the mixed urine from the bladder I detected no whole mites and no ova: but several disarticulated legs, perhaps parts of a cast cuticle, were found. Very large masses of epithelial cells were present, similar to those found in the ureteral specimens. A cystoscopic examination of the bladder gave a negative finding, the trigone and other parts appearing healthy. Washings from the bladder also showed no mites in the centrifugalized deposit.

In the urine from the catheterization of the right kidney only a single immature nymph was detected. In the urine from the left kidney no mites or ova were found, but numerous large masses of epithelial cells, similar to those from the other side, were present. I suggested to Mr. Thomson Walker the possibility that the prostate might also be a seat of the infection, but there did not appear to be any special clinical evidence of this, and the point was not investigated further.

For several days after the catheterization, the urine passed naturally with ordinary precautions against contamination, was searched for further mites, and several cast cuticles, fragments of legs, &c., and one good specimen of a male *Tarsonemus*, were found.

In connection with the patient's glandular condition, a lymphatic gland was excised from the left groin by Sir Douglas Shields. I examined this in various ways, films being made from portions fixed in formalin and in saturated corrosive. There was general proliferation of all the glandular elements, including the lymphocytes of the germinal follicles, and the adenoid reticulum and its endothelial cells, some of the latter being enlarged to form actively phagocytic cells, containing chiefly polymorphs (which were otherwise scanty in the gland) and an occasional lymphocyte.

No myelocytes were identified. Eosinophils in some sections were scanty, in others fairly numerous, in little groups, especially in the meshes of the adenoid reticulum and trabeculae of the sinuses. The changes did not appear to be typical of early Hodgkin's disease, the conditions found being equally common in various other diseases producing a toxic adenitis. There was some degree of pain in the enlarged glands, and other points in the clinical history seemed to militate against the condition being one of Hodgkin's disease. One finds a certain degree of eosinophil increase in other glandular affections, and if one had to give some definite diagnosis, the findings appeared to me to be compatible with some form of leucocythæmia; but the condition found in the gland did not correspond specially to that of the blood, in which cells of the granular marrow series predominated—a fact which would lead one to expect that some "infiltration" of the gland with these cells might be found. This, however, was not the case. One is led to speculate whether the blood-condition may be in any way produced by the mite-infection, but it is somewhat difficult to account for the glandular enlargement in a similar way, and there are no recorded cases, as far as I know, which help to throw any light on the problem. No mites were found in a large number of serial sections.

The blood-examination was repeated about three weeks later, the only appreciable alteration in that period being a drop of the hæmoglobin to 50 per cent., a slight relative rise in the polymorphs to 82.75 per cent., and a corresponding drop in the lymphocytes to 13.25 per cent.—the total leucocyte count being 23,900 per c.mm. One was left very much in the same difficulty as to whether one was dealing with a slight case of, or a remission in, a myelogenous plus lymphatic (i.e. a mixed) leukæmia—taking the blood and the gland pictures together; or whether the blood changes were partly, at all events, due to the mite-infection. To my mind it is difficult to account for the glandular enlargement wholly on this latter supposition, and one must be content simply to record one's findings.

Professor Ashworth again kindly identified the mites for me. He states that they belong to the family *Tarsonemidae*, but he was unable from the material I sent him to identify the species. The literature of the subject is scattered, and there is no one, so far as he knows, who has in this country been working on the subject of *Tarsonemus*, to whom we can refer for information or help. The chief difficulty in the identification was that females predominated, and males, upon which he relied for identification, were extremely few in number. He tells me, however, that there is no doubt as to the genus being *Tarsonemus*, which is known as infesting various plants, on which it causes the formation of small galls. There is one previous record (1910) of *Tarsonemus* in the urine of a patient with cystitis. I sent Dr. Ashworth some further specimens, and he came to the conclusion that the mites did not correspond with the account of the species previously recorded in man.

I hoped to be able to secure still more material for

Professor Ashworth to investigate, but unfortunately, soon afterwards, the patient became more seriously ill, with symptoms of cystitis and pyelitis, passing, in addition to pus and blood, a number of shreds and small sheets of fibrinous blood-clot containing pus-cells, the most probable source of which appeared to be the pelvis of the kidney, or, less probably, the bladder. No mites were found in the specimen. The patient died soon afterwards, and I was unable to persuade the relatives to grant permission for an autopsy.

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SUGGESTIONS FOR FURTHER RESEARCH IN SCHISTOSOMIASIS.¹

By FRANK MILTON.

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(Continued from p. 17.)

THE next question is perhaps of even greater importance, for on the answer to it may depend the possibility of controlling the disease in countries at present under its scourge.

This question is: Does an attack of schistosomiasis confer immunity against subsequent attacks?

The evidence we possess on this point is of two kinds.

(1) Certain features of the disease as seen in nature.

(2) Direct laboratory experiment.

Observers in all parts of the world in studying the age incidence of schistosomiasis dwell upon the fact that the period of life exhibiting the greatest proportionate infection is that of late childhood and of early adolescence, and they note that in the great majority of cases the disease contracted at this period of life, after continuing for a period of months, or it may be years, undergoes spontaneous cure.

We are at once struck by the fact that the common infectious disease of countries where these have been long established have a similar, if somewhat earlier, age incidence and run an analogous, though shorter, course.

In the case of measles, scarlet fever, chicken-pox, whooping-cough, &c., the germs of which are constantly present in European countries, it is the children and young adults who suffer, the more mature elements of society being exempt, and this exemption is acquired, as we know, through previous infection and recovery.

¹A paper read before the "Staff Club" at Kasr-el-Aini, February 28, 1920.

In Egypt practically every native of the country suffers from hæmaturia in his early youth, and in the vast majority of cases having recovered from this attack never again acquires the disease, a position of affairs which is precisely paralleled in South Africa.

At the same time the fact is daily brought to our knowledge that a considerable number of the agricultural population especially do suffer from the disease throughout their lives, and that many eventually succumb to it or its complications.

It may well be asked how this latter agrees with our theory of acquired immunity.

The answer is, I think, to be found in the fact that every specific disease conferring immunity does so in a degree which varies with the nature of the disease itself, and also with the power of resistance or reaction possessed by the individual attacked.

Thus the immunity conferred by an attack of small-pox is almost absolute and lifelong, yet it is known that in certain individuals second attacks of small-pox do occur.

Enteric fever confers a high degree of immunity, but second attacks are by no means unknown; similarly, whooping-cough is sometimes contracted by adults who have had the disease in childhood; and in measles a second or even third attack is comparatively common.

I take it the same thing may happen in schistosomiasis. In the vast majority of cases a patient having once harboured the parasite and lived it down becomes immune to further attack, the immunity being acquired by the formation in the cells of the recovered host of antibodies which impeach the development of any new generation of parasite finding its way into the body. The attacks of cercariæ will, probably, not be prevented, but the cercariæ having made their way into, or through, the skin, are unable to proceed or develop further and are killed off.

In exceptional cases the personal resistance of the individual attacked is unequal to the vigorous formation of antibodies, and he is therefore unable to resist the development in his tissues of fresh generations of parasites introduced from without and being subject to repeated reinfections suffers from chronic or progressive schistosomiasis.

In other cases again the resistance may be lower still or even altogether absent, and the patient may then die of acute schistosome toxæmia.

Careful observation will, I think, show that between the two extremes of an individual who acquires the disease, suffers from it for a short period, measured probably in months rather than years, and is never again attacked, and the individual who on being attacked by the parasite rapidly develops an acute toxæmia and succumbs, every stage of varying intensity will be found to exist, and will be recognized as having existed within the experience of many of you, the variation in the intensity of the disease being caused by the variation in the natural resistance and power of reaction possessed by the individual attacked.

This state of things is exactly reproduced in the common zymotic diseases which are known to confer immunity, and is seen in the mild cases of typhoid, small-pox, scarlet fever, and so on, and the so-called fulminating cases of these diseases where the patient is carried off in a condition of acute toxæmia.

It is only by assuming the existence of acquired immunity that we can account for the fact that numberless inhabitants of the Nile Valley who must pass their lives in continuous close contact with highly contaminated water, such as exists in the birkets and irrigation canals of the country, are, after one attack in their youth, free from grave manifestations of the disease throughout the rest of their lives.

Laboratory experiments in connection with this aspect of the disease are not plentiful, but such as are recorded would seem to confer the theory of immunity.

The outstanding experiments are those undertaken by Hamilton Fairley in his successful endeavours to fix an immune body in the serum of patients suffering from Egyptian schistosomiasis.

For the purpose of his experiments he used monkeys, which he infected artificially, and the points in his results which chiefly interest us are:—

(1) He records definite evidence of the presence of an immune body in the serum of patients affected with schistosomiasis, whether the disease be due to *S. mansoni* or to *S. hæmatobium*.

(2) In his infested monkeys he noted extreme degrees of variation in the intensity of the symptoms developed.

(3) During the early toxæmic stage, through which all infested subjects pass, a high eosinophilia, amounting to 40-45 per cent., was developed which diminished later, say from the fourteenth month onwards.

(4) In experimental monkeys dying early from the disease their sera never yielded a positive complement fixation reaction, and they showed, in every case save one, an entire absence of eosinophilia. This case, which did exhibit an increased eosinophilia, was that of a monkey which died in the ninth week with an eosinophilia of 11.9 per cent.

He further notes that in the chronic stage of human bilharziasis, i.e., in case of many years' standing, the eosinophilia is a much less constant feature of the disease.

It is to be noted that Fairley attributes the difference in the severity of the symptoms developed in his monkeys to differences in the massiveness of the doses received by them, but there is nothing in his paper to show that there was actually any difference in the amount of infective material introduced, all the monkeys appearing to have been treated in the same way during their exposure to infection.

From the foregoing I think we may fairly deduce:—

(1) An immune body having been definitely fixed

is an indication that some degree of protection from further attacks has been conferred on its possessor.

(2) The variations in the severity of the symptoms produced in the monkeys was due to, and an indication of, variations in the natural powers of resistance or reaction inherent in the individual monkeys.

(3) The amount of the eosinophilia produced is a measure of the capability of the individual to react against his infection. That where the eosinophilia is high the reaction is intense, and that where the eosinophilia is low the reaction is feeble, and it has been shown that the amount of immune body formed varies directly as the degree of eosinophilia produced.

(4) With an absence of eosinophilia and of reaction the invaded animal is unable to resist the toxins produced by the parasite and may succumb to acute toxæmia, the same result being brought about by an overwhelming dose of toxin consequent on a massive invasion of the host, the organism then not having time to elaborate sufficient antibody to cope successfully with the amount of toxin.

This is well illustrated in the case of the monkeys which died early from the disease with sera which failed to yield a positive reaction, and whose blood showed no eosinophilia. The monkey which died in the ninth week with 11.9 per cent. of eosinophilia was clearly able to make some degree of resistance, though this was not sufficiently strong to overcome his disease.

(5) The establishment of immunity takes an appreciable time, probably about one year, the decrease in the eosinophilia being probably an indication that this is complete. If this is so it would serve to explain the occurrence of dual infections with *S. hæmatobium* and *S. mansoni*, and of those cases where on post-mortem examination mature parasites of different ages have been found (it is interesting to note how rarely this has been recorded), and the case of Fujinami's, where he secured, experimentally, a second infection in a rat six months after the first had succeeded, the worms from the first infection being still alive.

(6) It is probable that those cases of chronic schistosomiasis in man with moderate eosinophilia are cases which on infection made but a feeble resistance, and in whom the consequent production of antibody was not sufficient to completely kill off successive generations of invading cercariæ, a few of which were able to withstand the feeble anti-toxin and to win through to the portal vein.

It is greatly to be regretted that Fairley did not take the opportunity of studying the effect of re-exposure to infection of his different classes of monkeys; had he done so the question of acquired immunity might have been already settled.

Up to this point we are dealing with probabilities and deductions; what we now want is actual demonstration.

So far I have only been able to find a single instance in which this has been attempted. It is that of Fujinami, who, in 1916, exposed three horses to

infection by standing them in water known to be highly infected.

Two of these horses had never had schistosomiasis, while the third had passed through an attack and had recovered two years before.

One of the unprotected horses died some months after the exposure, and more than 20,000 mature schistosomes were recovered from the veins of his portal system.

The other two horses were subsequently slaughtered. One thousand worms were recovered from the horse which had not previously had schistosomiasis, whilst in the one horse which was known to have had the disease and had recovered, not a single worm could be found on a very careful search, though traces of his old infection were present in the shape of healed lesions in the liver and scattered clumps of degenerated eggs in almost obliterated foci.

Sueyasu had also obtained a positive result on the examination of the blood of Fujinami's "immune" horse and a negative result from the non-immune, with both an aqueous and an alcoholic antigen.

Taking this evidence as a whole, we are probably justified in deciding that an attack of schistosomiasis does convey a high degree of immunity to subsequent attacks, but further experiments are required before the matter can be put beyond doubt.

If it be proved that immunity can be acquired, it should become a comparatively simple matter to elaborate a preventive vaccine, an extensive and properly directed use of which may eventually bring schistosomiasis under effective control.

We have seen that schistosomiasis has a world-wide distribution, and it has been assumed that the human parasite wherever found belongs to one of three species, either *S. hæmatobium*, *mansoni*, or *japonicum*.

Although the assumption is there, the grounds upon which it is founded are not very firm.

Omitting the contradictory evidence as to the presence of a spine in the egg of *S. japonicum*, where Cato, Katsurada, Booth and Wolley, and Huffmann are opposed by Leiper, Looss and Peake, and considering only the disease resulting from infestation, we note that the symptoms caused by *S. hæmatobium* in Egypt presents certain striking differences to that caused by what is supposed to be the same species of parasite in South Africa.

Thus while the peculiar hæmaturia is common to both, and the symptoms noticed in mild cases are the same, yet in the graver and more chronic cases the variations are pronounced.

Stone is a frequent complication of schistosomiasis in Egypt, but it is very rarely found in South Africa.

Urinary fistula, so common in Northern Africa, is absolutely unknown in the South, as likewise are cases exhibiting those masses of bilharzial growth so frequently met with in the bladder, intestine, and peritoneal cavity in Egypt.

On the other hand, the bilharzial affection of the lungs revealed as infiltration and ulceration of their tissue so commonly encountered in South Africa is practically unknown in Egypt.

These differences are sufficient to suggest variations in the habits, and possibly in the specific nature of the causal parasites, differences which can only be verified by a minute comparison of the structure of the mature worms. And here we make the somewhat startling discovery that really good descriptions of schistosomes in any of their stages of development are almost non-existent.

With the exception of Montgomery's descriptions of the mature worms, of which those of *S. hæmatobium* and *S. mansoni* are the poorest, and Sewell's description of his *Cercaria indica* XXX, there hardly exists a decent description of any schistosome in any of its stages of development.

Descriptions there are of individual specimens, some of them of great interest; but since each author lays stress on a few anatomical details which have struck him individually as being important or interesting, and omits to refer to others which have happened not to have excited his interest, minute and detailed comparison of the descriptions of the parasites is impossible.

Until there is a settled anatomical nomenclature and a recognized scheme for descriptions of the parasites, certainty of identification is impossible.

There seems to be uncertainty even as to what are the essential characteristics of a schistosome.

Leiper makes the absence of a pharynx the test for the bilharzial group of schistosomes.

Faust would classify schistosomes according to the degree of development of the pharynx, but puts the human schistosomes (Leiper's "bilharzial group") in a class apart from "those without a pharynx, but with well-developed mucin glands," whilst Cort excludes the pharyngeal furcocercous cercariæ from the schistosomatidæ altogether.

The anatomical nomenclature of the schistosome cercariæ is chaotic, and the true nature of the parts and organs described is often uncertain. The unicellular glands surrounding the acetabulum are known variously as the "cephalic glands" (there is already a "head gland," "bearing," or "surrounding," or, according to Cort, "contained in" the oral sucker), "salivary gland," "mucin glands," "salivary mucin glands," "poison glands," "stylet glands," or "cystogenous glands."

In some descriptions the genitalia are noted (in describing *C. gracillima* Faust indulges in what is

almost an orgy in describing these), but in most accounts they are omitted altogether, whereas in describing *C. gigas* Faust calls the collection of small cells immediately posterior to the acetabulum "salivary mucin glands," though they are probably a gonad.

The description of the excretory system and bladder by Cort and by Faust are entirely irreconcilable. Faust limits the "bladder" to the contractile receptacle in the posterior part of the body of the cercaria, whilst Cort includes in "bladder" not only this receptacle, but also what are generally described as the main collecting tubes, and the whole of that portion of the excretory system which is contained in the tail right down to the excretory pores. Cort describes the channels from the flame cells as draining in to the "bladder" and the channel passing down the tail (though still "bladder") as efferent. Faust describes all channels, both those from the flame cells and that in the tail as afferent, and suppresses the excretory pores in the rami altogether.

As an example of the way in which important structures crop up in, or are omitted from, descriptions, and of the loose terminology employed, we may take the following:—

There are structures, described by Sewell with his usual thoroughness, as "vibratile flagellæ" existing in the main collecting tubules of the excretory system. In the many descriptions and references to the cercariæ of the schistosomes and the nearly related furcocercous cercariæ given by other authors, these structures appear to be referred to only twice, once by Faust in his description of *C. gracillima*, where he states "flame cilia are present in a restricted region of the main tubes in the posterior third of the body," and the second time by Cort, who says "a short region of the bladder on each side near the points where the collecting tubes enter is ciliated." As Cort's "bladder" continues right up to the point of entrance of the tubules from the flame cells, his "ciliated patches," however, must be at the extreme distal end of the main collecting tubules instead of near their proximal extremity.

I have rather laboured these deficiencies in descriptions, as I want you to realize how little we really know of the morphology of the schistosomes, and in the hope that some among you may be moved to give us at an early period a real systematized description of the Egyptian schistosomes in all their stages of development, and at the same time work out an anatomical nomenclature which may be accepted as a universal standard. It would seem much better if, instead of giving organs, seen, say, in the cercariæ, names which may more or less describe their supposed functions, we were to satisfy ourselves by giving non-committal names such as those which mark their position in the body. In the schistosome cercariæ this is particularly easy, as most of the important structures are grouped round the ventral sucker, thus the "poison, &c.," glands would become the peri-acetabular glands, the collection of cells immediately behind this sucker,

¹ Since this paper was read I have seen the paper by Manson-Bahr and Hamilton Fairley with descriptions of *S. hæmatobium* and *S. mansoni*. The descriptions are good, but I hope they may be bettered by some of the staff of Kasr-el-Aini. Also a new confusion has been introduced: Glen Liston and Sopárkar claim that the schistosome found by them in Calcutta is the cercaria of *S. spindalis*. Bahr and Fairley, reporting on Glen Liston's material, state that the cercaria has "a well-marked pharynx," whereas Montgomery states that *S. spindalis* is apharyngeal, the only Indian schistosome with any approach to a pharynx being *S. indicum*.

and which are probably a gonad, would become the post-acetabular gland; the circular collection of cells immediately in front of the acetabulum, which may be either connected with the digestive or the nervous system, would be the pre-acetabular gland, and so on; and the word "head gland," which is probably muscular and not glandular at all, be abolished altogether.

In this paper I have tried to indicate some directions in which further research in connection with schistosomiasis and the human schistosomes is urgently required, and I trust that someone connected with my old school at Kasr-el-Aini may speedily find the true solutions of the questions I have asked.

Syphilitic Peritonitis (Prof. Maurice Letulle, M.D., *Medical Press and Circular*, vol. cxi, January, 1921).—The author comes to the conclusion that cirrhosis of the liver is often due to syphilis, and that syphilitic peritonitis often accompanies hepatic cirrhosis. The disease plays a foremost part in the causation of ascites, but it is usually curable. Consequently, in every case of aseitogenous cirrhosis a syphilitic origin should be suspected even when there are signs of alcoholism or tuberculosis. It is logical to deduce from this that it is worth while trying the effect of a course of specific treatment in the case of liver cirrhosis. The patient does not stand to lose thereby, and in some instances may derive the greatest benefit.

Omission of Preliminary Purge with Oil of Chenopodium (W. Rose, *International Health Board*. Sixth Annual Report, 1920).—Most of the authorities hold that better results are obtained if the pre-treatment purgative is given; and in hospital practice, where the patient can rest and be under constant observation, it seems best to give it. But when it is given in field work, many of the patients, after it has acted, become weak, and in some instances are unfit for work next day, with the result that they lodge complaints against the treatment. Moreover, in sparsely settled rural areas the administration of a preliminary purge is a difficult procedure and almost doubles the cost of treatment. The original experiments of Darling, Barber, and Hacker, although dealing with a number of cases too small to enable trustworthy conclusions to be drawn from them, nevertheless showed that when this purge was omitted and the other factors were kept the same as in routine treatment, two standard doses of $1\frac{1}{2}$ mls of chenopodium cured 80 per cent. of the cases and removed 95 per cent. of the total worms. This suggested that with an interval of twelve hours between eating and the administration of the vermifuge, the preliminary purge might be omitted.

In field treatments given during 1919 in Guatemala, Brazil, Ceylon, and the Seychelles Islands, preliminary purgation was omitted. No ill effects resulted in any of these areas, and there was no decrease in the percentage of cures as compared with that in other areas.

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THE JOURNAL OF Tropical Medicine and Hygiene

FEBRUARY 1, 1921.

RIVER POLLUTION.

The pollution of a river, especially in warm climates, is a matter of moment and concern to medical men. Even in temperate climates the question is fraught with many misgivings and leads to suspicion when an epidemic of intestinal ailments

occurs. The source of the outbreak points naturally to a faulty water supply, be it where water is supplied from rain-water tanks, from shallow wells, or from river water collected in reservoirs or taken directly from the adjacent river itself. The dread of mankind is pollution of water from human excreta carrying the infective germs of typhoid, cholera, dysentery and diarrhoea. The micro-organisms to which these are due emanate from the intestinal tract, from a canal where light is absent and air does not enter. They live and multiply in non-aerial surroundings and thrive amongst gases which spell death to most other organisms, be they pathological or harmless.

The sewage in the course of a long river where from inland cities the drains pour their untreated contents into the adjacent river, endangers the towns and villages lower down, especially where the water supply is taken from the river and not from wells or lakes in the neighbourhood; where the stretch of water is many miles in length between the upper town on the river and the next below, the effect of this contamination was observed to be slight if any; but where but a short strip of river only intervenes, it is noticed that the town lower down suffers. The inland City of Paris illustrates fully the phenomena attaching to the pollution of a river. The water is drawn from the Seine above Paris, passes through Paris, and after being used for all purposes issues from the great central sewer and falls into the Seine below the town. The polluted river shows that the effect on vegetable and animal life is immediate, all vegetation disappears from the river banks and the fish in the river disappear. By and by, as the river speeds on its course, its appearance becomes more normal; on the banks first scant and then profuse vegetation appears; fish are to be found in the stream, and to all appearances the river resumes its supra-Paris condition and numerous towns, Triel, Mantes and Rouen, feel little or no evil effects from the Paris pollution. The germs of typhoid, cholera, dysentery and intestinal ailments disappear by oxidation.

In a hot climate the river pollution means more, however, than in a northerly climate. Take the Nile as an example. Here we have many factors to consider, for the Nile is at once the source of the water supply to the communities along its long length, the latrine in many cases, the receptacle for dead horses, cattle, dogs, &c., and in many instances of dead human beings. It becomes a vast sewer, for pollution is inevitable. One can see, along the lower reaches of the Nile, the villagers approaching the river bank with their jars to draw the water, stand the jar on one of the numerous river boats secured to the bank, then crawl over the stern of the boat, stand on the big helm, the upper border of which protrudes above the water, and there defecate into the river. When finished they turn round and fill the jar with the water and take it home. Were there but one boat along the bank, the pollution of the water they take to their homes might not be so great; but many boats may be

there, and those that are lowest down in the row gather the excreta of those immediately above. The writer has seen this occur again and again, even when cholera was rife all over Lower Egypt. Away out in the river a dead horse or mule or human being may be seen to float past, adding yet more to the contamination of the river water. Egypt has from the earliest periods of recorded time been devastated by plagues and epidemics, and the cause is not far to seek.

As with the Nile, so with many of the Asiatic rivers, the Ganges, the Yang-tse and the Canton river. Anyone, moreover, who has seen the Ganges at Benares during the ablution season crowded with thousands of religious devotees can understand that yet another source of pollution is to hand in addition to those recorded above. In China even the polluted river water is an improvement upon the well water available. The well in a Chinese compound is situated in the centre of the yard where animals are enclosed. It is, of course, a shallow well, and the yard drains into it both by percolation and by direct surface flow, especially during wet weather. The Chinaman knows well by long experience the dangers of the well water, and boils the water preparatory to making tea, which is the invariable form of drink he imbibes; he never drinks plain water, being well aware of the evil consequences which ensue.

It is curious to reflect that with all the forms of pollution of rivers in hot countries mentioned above, the greatest populations of the earth are collected in the countries where river pollution is greatest. China and India between them contain well-nigh half of the population of the earth; famines are common; epidemics are rife; the struggle for existence is greatest, and all the elements which go to keep their population at a minimum are in evidence. One naturally asks: Is river pollution so dangerous as it is said to be; are we raising and fighting against a bogey of our own creation, fantastic and illusive, or are there explanations of how this apparent topsy-turvydom is thwarted?

Is typhoid due to water infection? This would seem irrefutable. The last outbreak at Maidstone, in Kent, was traced to infection of the water supply of the town by the typhoid bacillus, due to water in the collecting area becoming infected. It is needless to labour this point, which is an accepted axiom of scientific observation and investigation. The matter is also proved by negation. Since the sewage of the towns on the Thames has been scientifically dealt with above the spot from which the water supplied to London is drawn typhoid has disappeared amongst Londoners. The cases occasionally met with are importations to the city; they are cases infected outside the London area. The writer has sent three cases of typhoid within recent years to one of our London hospitals. In that hospital no case of typhoid had been seen for three years previously. So rarely is the disease met with that students from other hospitals were brought to see this rare ailment. Before the town sewage of

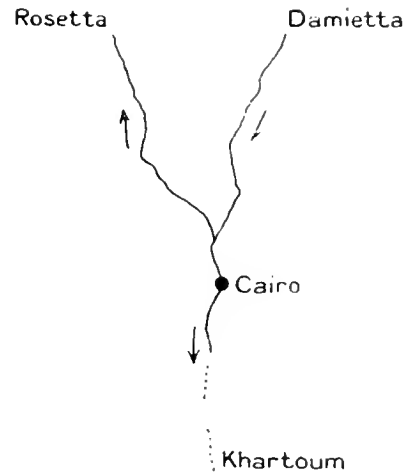
the "up" rivers was dealt with scientifically our hospitals were flooded with typhoid cases. It was the disease that occupied the attention of teachers, students and nurses. In a few years typhoid will occupy a secondary place in our teaching and textbooks and will be viewed in the same category as cholera or leprosy.

After all, open drainage has theoretically much in its favour, especially in tropical countries; and the rivers in most of these countries are but open sewers receiving the sewage from the towns and villages along their banks in which open drainage is the rule. Open drainage has much against it; it is inconvenient, it smells at times badly, it means wider streets, a constant and plentiful supply of water, it is unseemly, impossible in fact in commercial cities where goods have to be received and delivered; it is inconceivable from all points of view, except in small hamlets upon a hillside where the fall of water is such that there is no blocking of the channels, &c. What then is the explanation of these Eastern countries rearing such a large population as to outdo in numbers the more sanitariously arranged towns of Europe and America, Australia, &c.?

Early marriage and plurality of wives, customs which prevail in the East, produce children to an extent unknown elsewhere. The mother suckles her child, bottles and infant foods are unknown quantities, and more children reach the age of one year than in more "civilized" (so-called) peoples. The death-rate after this is much higher than in the West, but the plethora of infants more than outbalances the mortality of the older children and so the population increases.

The Chinese, the most populous of all nations, avoid the evils of contaminated water by the use of tea, not because the tea itself is of supreme value, but because before it can be drunk the water must be boiled, and the evils of contamination countered. In Australia again, tea is the drink; water in a new and agricultural country is apt to be contaminated; the byre and manure heap are close to the house, and the well must also be beside the dwelling, and contamination thereby rendered inevitable. Hence the boiling of the water is essential and, to flavour it, tea is added. A peculiar and not easily explained transmission of disease along a waterway was described as long ago as 1883 by the writer. He observed that in the cholera epidemic in Egypt in 1883 the disease spread from the Damietta branch of the river up to Cairo, but below Cairo, where the main river divides into the Rosetta and Damietta branches, cholera spread not only upwards to Cairo and the Fayoum district and far beyond towards Khartoum, but also downwards along the Rosetta branch as far as the sea. The diagram will explain the course of the epidemic. It was very marked how the disease attacked the towns along the river chiefly, for at Alexandria the cholera deaths were but some two per day, whilst at the same time the people were dying in Cairo at the rate of 1,000 daily. Later cholera was observed to gradually pass

up the river and districts were attacked for at least twelve months afterwards. The writer was inclined to attribute the source of infection to the fish



ascending the river, and there has been much to show from subsequent observers that this theory has been borne out to a considerable extent in other countries.

J. CANTLIE.

Annotations.

Diseases due to Intestinal Parasites in Colombia and their Treatment (Otto T. Brosius, M.D., and William A. Bishop, M.D., *Journal of the American Medical Association*).—The authors summarize their work as follows: 1. Hookworm disease is almost ubiquitous among the natives of the district of Zaragoza, 98 per cent. of the inhabitants being infected. We believe that with the centrifugal method of diagnosis this percentage might be made a little higher, and we are also of the opinion that this figure is almost generally applicable to all the inhabitants of the low, hot lands of Colombia. Here, if anywhere, there is due need of hookworm campaigns, education and sanitation.

2. All forms of intestinal parasites apparently live and thrive in the same individual, no type producing conditions inimical to the life of others.

3. We have come to the conclusion that the normal hæmoglobin contents of the natives of this region is somewhat lower than that of natives of the temperate zone—about 70 per cent.—and think possibly this assertion may prove applicable to all natives of the equatorial belt. Our investigations have shown that the present hookworm-infested population of Zaragoza has an average hæmoglobin percentage of 47. Except in rare instances, a removal of the hookworms from the intestine of a sufferer is immediately followed by a rise in the hæmoglobin percentage, without any other treatment

being employed to bring this about. Doubt exists in our minds as to whether the exhibition of iron-containing medicines will accelerate or augment the normal gain that has been noted after a thorough removal of hookworms. The gain in hæmoglobin varies from 20 to 50 per cent., being most marked and most rapid in children, less rapid in young adults, and more slow after middle life.

4. Ninety-eight per cent. of a selected list of apparently chronic hookworm cases showed eosinophilia, and the average percentage of these cells in these cases was 10.91.

5. The unusual symptoms of hookworm disease, noticed in the cases coming under our observation, have been general depression, nausea and vomiting and diarrhoea. Severe abdominal pains are at once traceable solely to the presence of hookworms or ascarides.

6. During our work with chenopodium at Santo Tomas Hospital, we saw several cases that exhibited toxic symptoms which we believed were attributable to chenopodium. Those symptoms were nausea, vomiting, general depression and weakness and vertigo, with deafness, rarely permanent, usually being temporary. When permanent it always had a background of syphilis or other pre-existing disease. Deaths have been reported, one of which came under our observation.

Endeavouring to eliminate the possibility of these uncomfortable occurrences, the dosage of the drug was reduced from 48 minims to from 35 to 40 minims for a treatment, and we find that in 430 cases 750 treatments were necessary to effect cures. Or, in other words, we have found that 1.75 treatments per case were necessary, in this series of 430 cases, to effect a cure. In a smaller unselected series, 2.4 treatments were necessary.

We feel certain that most investigators will agree with us that whatever the dosage, the great majority of cases will require more than one treatment thoroughly to remove the worms in a given case.

If the fact can be established that a 35 to 40 minim treatment is all that is necessary, and that in the great majority of instances two of such treatments will effect a cure, it should do much to lighten the field work of the hookworm commissions, and operate to widen this scope and hasten results.

The fact that oil of chenopodium acts as a vermifuge to more than one of the other intestinal parasites is an added factor in its favour.

The result of these investigations shows that the first treatment always removes most of the worms, namely, about 84 per cent., and the percentage removal for ascarides is about the same (88).

7. *Amœba histolytica* occurred in 12.5 per cent. of the cases investigated, and we believe that this represents the average incidence of this disease in this district.

8. *Trichocephalus dispar* has an average incidence of about 34 per cent. In fifty cases treated with chenopodium, in which complete cures were obtained of the co-existing uncinaria and ascaris infection, only four were noted in which *Trichocephalus dispar* eggs

could not be detected in the stools at the end of the treatment.

Intra-Intestinal Tube Treatment of Hookworm Disease (W. Rose, *International Health Board*. Sixth Annual Report, 1920).—A new method of treating hookworm disease, known as the intra-intestinal tube method, was devised during 1918 by Kantor, who used it with excellent results in the treatment of over 250 cases in the United States Army Hospital at Fort Oglethorpe.

When this technic is employed the patient is given a light meal—chiefly rice and milk—on the evening before the treatment. There is no preliminary catharsis. The next morning about 7.30 the duodenal tube is swallowed on a fasting stomach, and the patient is kept on his right side until the bucket has passed the pylorus. The exact time at which the bucket enters the intestine can be determined by aspiration. While it is in the stomach, aspiration withdraws a clear fluid, seldom bile-tinged, and generally positive to Congo paper; and if water is injected into the tube, followed by a syringe of air to clear the tube, the greater part of the water can be withdrawn by aspiration. When the bucket has entered the duodenum, aspiration withdraws golden-yellow viscid bile, negative to Congo paper. The water injected flows on into the intestines and only a small amount can be recovered.

As soon as the bucket reaches the duodenum the patient is ready to receive the drug. This is injected with a syringe (preferably of glass, and of about 30 mls capacity) and is followed by a barrel or two of air to ensure the expulsion of the entire dose from the tube. The dosage of vermifuge usually employed is 3 mls of oil of chenopodium. Following the injection, a period of six minutes is allowed for diffusion of the oil throughout the worm-infested region. At the expiration of this time 2 to 3 oz. of warmed saturated solution of magnesium sulphate are given transduodenally to remove the drug quickly from the very highly absorptive small intestine. Within half an hour the majority of patients have a copious watery stool containing oil, and sometimes worms. This flush method of controlling the drug permits its use in doses ordinarily considered dangerous.

After the salts are given the tube is removed and the treatment is complete. In most cases from three to five stools follow the first. If a sufficient number do not result, further catharsis may be administered by mouth. The patient is generally sick during the day of treatment, but by 5 p.m. he is ready for a light meal, and usually he has made a complete recovery by the next morning.

Citrate of Soda in Pathological Venous States (Ozo, *Gaz. des Hôpitaux*, September, 1920).—The author records a remarkable instance of recovery from senile gangrene complicated by extensive bed sores, in which

improvement has been ascribed to the administration of one-gramme doses of citrate of soda. The patient, who had been suffering from very severe pain along the track of the arteries of the lower limbs, experienced entire relief within a few hours of the commencement of the treatment. Its use would seem to be indicated in cases where there is reason to apprehend the formation of clots in the cerebral circulation. The clotting tendency is associated with enhanced viscosity of the blood which hinders its progress through the vessels, and this danger is particularly likely to present itself in diabetic subjects, owing to the presence of an undue proportion of sugar in the blood.

Abstracts.

NOTES OF A CASE OF ENTERIC FEVER ASSOCIATED WITH APPENDICITIS.¹

By S. C. PAUL, M.D., F.R.C.S.

Senior Surgeon, General Hospital, Colombo.

THE association of appendicitis with enteric fever is not of common occurrence, in spite of the fact that in enteric fever the brunt of the inflammation falls chiefly on the coils of intestine in the neighbourhood of the ileo-cæcal orifice. Sometimes the onset of enteric fever is ushered in by some severe abdominal pain, and marked tenderness in the right iliac fossa; and these are just the cases which offer considerable difficulties in diagnosis, and are a source of great anxiety to the physician. The fever is usually high, but the pulse is generally about 80, and although there is considerable pain and tenderness, there is as a rule no rigidity of the abdominal muscles. On careful palpation, however, the abdominal tenderness is found to be more diffuse than is met with in early cases of appendicitis. A few days' waiting usually settles the diagnosis, as the fever continues at a higher rate, while the tenderness and abdominal discomfort get less and less.

In another class of cases the appendix becomes the seat of the specific typhoid infection and subsequent ulceration. Generally about the second week of fever abdominal pain and tenderness over right iliac fossa with muscular rigidity is noted. In these cases perforation of the appendix at one of the ulcerated spots may take place, giving rise to either general or localized peritonitis. The appendix along with the cæcum and the neighbouring coils of the ileum show areas of typhoidal inflammation and ulceration.

There is another group of cases which is extremely rare, in which inflammation of the appendix may occur which has no specific relation to enteric fever, except that it may take place during an attack of enteric fever. I am indebted to Dr. Dadabhoj, my

house surgeon, for the notes of such a case which came under my care in the hospital.

Miss M., aged 16, was admitted to the hospital with a history of fever of two weeks' duration and abdominal pain and tenderness of right iliac fossa. The onset of the disease was characterized by severe headache and abdominal pain, which was at first centred about the umbilical region, and subsequently became localized in the right iliac fossa. There was a good deal of gastric irritability at first. Nausea and vomiting were prominent symptoms from the very outset, as a result of which patient was not able to take very much nourishment. On admission the abdomen was distended, and there was marked tenderness over the right iliac fossa. The muscles overlying this area were slightly rigid and moved sluggishly with respiration. The pulse was 108, of fairly good volume and tension, and the temperature registered 102° F. The tongue was thickly coated in the centre, but the sides and tip were clean and moist. The liver was enlarged and extended an inch below the costal margin, and there was some tenderness over the gall-bladder area. There was no enlargement of the spleen. The patient was kept under observation for a couple of days, as there was some doubt as to whether it was not a case of enteric fever. But as the pain and rigidity became more pronounced I decided to operate. The operation was performed on February 19. The appendix was reached through the usual oblique incision. It was 5 in. long and very congested. The cæcum and the neighbouring coil of ileum were normal. There were no signs of peritonitis. On slitting up the appendix no ulcerative patches were seen, but the mucous membrane was studded with punctate ecchymosis, especially in its lower half. After the operation the patient suffered a good deal from vomiting which lasted for three days. On the third day after the operation she had three attacks of severe intestinal hæmorrhage. This was treated by injections of morphia and calcium lactate internally. As the condition did not improve she was given an injection of horse serum along with 2 c.c. of hæmoplastin. On the next day there was another sharp attack of hæmorrhage and another 10 c.c. of horse serum was administered. The pulse was rapid and small and was 140 to the minute. The temperature varied from 102° F. to 104° F. From the 26th she showed signs of improvement, and the temperature gradually dropped to 99° F. on the 28th. The blood was sent up for Widal's reaction and was reported to be positive. On the 29th the temperature rose up to 102° F., and she complained of a slight cough; on examination the base of the left lung showed signs of consolidation. This became more marked the next day, and the ratio of respiration to pulse was 1 to 2, the temperature varied from 102° F. to 104° F., and on March 4 the temperature came down to 99° F., and her general condition improved. But on March 6 both parotids became enlarged and tender. The temperature began to rise gradually and registered between 104° F. and 105° F. The left parotid

¹ Abstracted from the *Journal of the Ceylon Branch of the British Medical Association*.

suppurated and was opened and drained, while the right parotid swelling gradually subsided. The temperature still continued high, and there was a free discharge of pus from the left ear which was the result of the extension of the parotid suppuration to the external meatus. Pyæmic abscesses appeared on the upper and lower extremities. These were opened and the patient treated with 10 c.c. of anti-streptococcal serum. On March 28 the temperature dropped to normal, but the chapter of complications had not ended here, for she developed a bed sore which gradually healed up, and the patient was able to leave hospital a week later.

I have brought this case to your notice partly because of the association of appendicitis during the course of enteric fever, and partly on account of the number of complications which the patient developed during the course of the disease. It may, however, be pointed out that there is nothing to prove that the appendicular inflammation was a distinct entity independent of the typhoid germ. The absence of any demonstrable lesion in the cæcum and the neighbouring coil of ileum may be taken as proof that the appendicular inflammation was not due to extension of inflammation from these parts, and the occurrence of wonted hæmorrhage on the fourth day of operation shows that there must have been typhoid ulcerations of some magnitude higher up. Petechial hæmorrhages in the submucous tissue of the appendix is a common condition observed in cases of subacute appendicitis, and I regard them as of toxic origin due to toxins of micro-organisms acting on the blood-vessels, causing a capillary hæmorrhage into the submucous tissue or a hæmorrhagic infarction. So long as the hæmorrhage patch does not reach the mucous membrane no ulceration occurs, and there is a possibility of the exudation to be absorbed.

If the condition has started as an infection of the lymphoid follicles, one would expect a central necrosis of the lymphoid follicles leading to ulceration.

Current Literature.

INDIAN MEDICAL GAZETTE.

Vol. LV, No. 12, December, 1920.

The Prevalence in India of Gastric and Duodenal Ulcer and Allied Conditions of the Upper Abdomen, with some observations on the Diagnosis and Treatment (W. J. Wantless, M.D., F.A.C.S.).—The author emphasizes the frequency of gastric and duodenal ulcers in India, and gives the results of surgical treatment he has carried out in such cases.

Some Observations on Blood-pressure during Intravenous Injection of Quinine in the Treatment of Malarial Fever (U. N. Brahmachari, M.D., M.A., Ph.D.).—The author states that in his experience intravenous injections of quinine in concentrated

solution (10 gr. in 20 c.c.) is generally followed by a fall in blood-pressure and sometimes by a disappearance of the pulse for a few seconds. Intravenous injections of quinine in dilute solution (10 gr. in 200 c.c.) may be followed by a fall in blood-pressure, but this is neither so sudden nor so great as in the case of concentrated solutions. In many cases there is no fall of blood-pressure. The slower the injection is given, the less is the chance of fall of blood-pressure taking place. The diminished blood-pressure after intravenous injection of quinine may persist for twelve hours or more after the injection.

Intravenous injections of quinine should always be given in very dilute form (1 in 300). The injection must be given at the rate of 10 c.c. every minute. It should never be lightly undertaken.

If these precautions are taken, the dangers of intravenous injections of quinine will be reduced to a minimum.

Some Further Observations in Rupture of the Spleen (P. H. Hennessy, M.R.C.S.).—According to the author, rupture of the spleen is fairly common in India, owing to the very large number of natives affected with malarial splenomegaly.

Cutaneous Myiasis in Man and Animals in India (W. S. Patton, M.B.).—The author collected a number of maggots from cases of cutaneous myiasis in man and animals and specimens were sent to Dr. Villeneuve, who stated that they were larvæ of *Chrysomya bezziana*. This fly has so far only been recorded from the Belgian Congo, the Ivory Coast and French Guinea, where its larvæ cause cutaneous myiasis in larger animals but not so in man; whereas in India it attacks man in the same way as animals. The female fly lays its eggs on, or in living tissues, attracted by foul discharges. The larvæ die if placed in the body of a recently dead or a decomposing animal, in which situation most blow-flies flourish.

A Case of Acute Catarrhal Jaundice (A. Bayley de Castro).—The author illustrates a case of acute catarrhal jaundice which lasted for nine days. The patient was admitted with a mild fever and vertigo, and afterwards severe pains. On the fourth day there was a general improvement in condition; on the fifth, the patient was almost normal and requested more food. On the sixth day, however, a change for the worse set in, which continued, ending on the ninth day in sudden collapse and death.

Case of Intolerance to Aspirin (Charles Clyne, M.C., M.B., Ch.B.).—The author describes a case of intolerance to aspirin where a 5-gr. "Empirin" tabloid (B. W. & Co.'s substitute for aspirin) was taken. The patient was a robust man of 41; the effects of the tabloid were marked œdema of the face, neck, eyelids, and lobes of ears and lips, also an urticarial rash all over the body, more especially on the face and upper extremities. Rest and a saline purge were ordered, and in three days the patient had completely recovered.

Original Communications.

THE TREATMENT OF SMALL-POX BY THE EXTERNAL APPLICATION OF POTASSIUM PERMANGANATE.

By

ANDREW BALFOUR, C.B., C.M.G., M.D., F.R.C.P.E., D.P.H.

Director-in-Chief Wellcome Bureau of Scientific Research.

THE object of this short note is to direct the attention of medical officers in the tropics to a method of treating small-pox cases by the external application of a solution of potassium permanganate. The method is not new. It was introduced by Dreyer, of Cairo, in 1910, but apparently it has been forgotten, save by the Germans, who have used it on several occasions with marked success.

Anyone familiar with variola amongst natives in the tropics, and more especially in the outlying districts, must have been impressed by the urgent necessity of some means of treatment likely to mitigate the sufferings of confluent cases and to prevent complications.

Small-pox in the unvaccinated and amongst primitive surroundings is a very terrible disease. I have seen outbreaks in Persia, East Africa, Uganda, Egypt and the Anglo-Egyptian Sudan, sometimes in places where proper hospital facilities were lacking, and where the condition of many of the patients was pitiful to behold. The doctor, with no ally in the shape of a trained nurse, is often at his wits' end to know what to do in such cases, and a simple method like that of Dreyer should be hailed as a boon and a blessing, especially as its value appears to have been definitely established. Indeed, Bender, of Breslau, states that he regards it as superior to every other therapeutic measure in small-pox. His technique is as follows:—

When the patient is admitted to hospital his whole body is painted over with a freshly prepared saturated solution (5 per cent.) of potassium permanganate. On each successive day the same solution is applied, unless the skin is found too sensitive, in which case a weaker solution is employed, one of 1.5 per cent. being often suitable.

Favourable results from the use of permanganate solution have also been recorded by Kulka, Jochmann and Morawetz. Indeed the only discordant note is sounded by Rolly, who, according to Kulka, was sceptical as to the utility of the treatment. I have not been able to consult Rolly's paper, but the other authors all undoubtedly think well of the method, though they differ somewhat in the strength of the solution they employ. Kulka, for example, finds 3 per 1,000 efficient, but as he speaks of this as a concentrated solution it is possible that he really means 3 per cent.

Dreyer¹ had two objects in view when introducing

the treatment, the first being to colour the skin and thereby obtain an effect similar to that which the Finsen red light treatment is said to produce, the second to secure a disinfecting and deodorizing action.

In the view of many the value of the red light treatment of small-pox is not considered to have been established, and hence the good results of the Dreyer method must probably be attributed solely to the germicidal and oxidizing powers of the permanganate.

There seems to be no doubt that in the case of small-pox this line of treatment, especially if employed early, is of signal service in lessening the suppurative process and adding to the patient's comfort. It is also said to prevent complications, the formation of bed-sores and the occurrence of general sepsis. Septic fever is thus avoided and the recovery rate improved. As the suppuration is mitigated the pitting of the skin is reduced.

Further, it would seem to possess hygienic advantages by lessening the risks of infection. At the present time, if employed on a large scale, this permanganate treatment would be somewhat expensive, but there appear to be good grounds for recommending its employment, if not universally, at least in severe cases where facilities for proper nursing and attention are lacking. It is hoped that medical officers in the tropics will give it a systematic trial and report their experiences with it.

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ON THE IMPROVEMENT OF OILING FLUIDS FOR ANTI-MOSQUITO WORK.

By W. NORMAN LEAK, B.A., B.C.Camb., M.R.C.S., &c.

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THE method which has been and still is most widely used to prevent the growth of mosquito larvae in water is to "oil" the surface with a film of paraffin oil. This film method, though by no means an ideal one, has in many places met with extraordinary success, although those who have used it most extensively would be the first to agree that paraffin is certainly not a perfect film producer. Many attempts have been made to improve on the ordinary paraffin film, but no very striking results have been obtained, or at least no

¹ According to W. Dreyer, this treatment should be used with care in cases suffering from actual heart disease, or from cardiac weakness, the result of the small-pox infection.

definite modifications are at present largely in use. The admixture of linseed oil was, I believe, used with a certain amount of success by the troops in Persia, the chief gain being that of increased permanence. Cotton-seed oil used instead of the linseed oil would give an even more permanent film, but these additions tend to diminish the spreading power of the oil. Other modifications might be mentioned, but, without tabulating them, I will pass on to an observation which I made while recently engaged in anti-mosquito work in Palestine which does seem to open up enormous possibilities.

The observation consisted in noting the extraordinary effect which small additions of castor oil have on the spreading power of paraffin. The way by which I was led to concentrate on castor oil was in seeking to find a satisfactory film with which to oil cesspits, and in course of this I tried the addition of cresol and found that such films spread remarkably well on water. All the substances which go to make up cresol were then examined as to their effect, together with any of their allies which were available, and finally, much to my astonishment, it was found that castor oil was the active factor. No other oil was found which had a title of the effect of castor oil, so I shall briefly describe the properties which it seems to add to a paraffin film, and then seek to indicate a few lines along which it seems to point out further progress as being possible.

Castor oil is ordinarily said to be insoluble in mineral oils, but in a warm climate a mixture up to 2 per cent. can be made which will not separate out appreciably in a week, while in cool climates only about 0.5 per cent. will remain suspended for any length of time. However, the addition of very small amounts of castor oil makes a very decided difference on the behaviour of the film. As little as one-tenth per cent. produces a very much more active film in every way, and the effect is more marked the higher the concentration. To give a definite example, if one drop of paraffin will make a film five inches in diameter, on the same surface a similar sized drop with 1 per cent. castor oil added will immediately make a film two feet in diameter, so that the spreading power has been increased about twenty-five times. Paraffin oil in bulk, when poured on to water will spread up to a point, and after that it ceases to spread effectively and the edges get broken. The castor oil mixture film retains its continuity very much longer and its edges appear to retain their power of spreading actively as long as there is space to be covered. To quote another example, on an exceptionally clean surface of water two ounces of paraffin spread over an area about five yards in diameter. A similar quantity of 1 per cent. mixture in a quarter of an hour had spread in an unbroken film thirty yards in diameter, and was still actively spreading. The thickness of such a film is minute, but the experiment serves to illustrate the great activity of the castor oil mixture, and suggests that it could be used in places where hitherto paraffin has not been applicable. The eventual thickness of a film is, of course, determined by the actual amount of oil allowed per unit of area provided that the film will spread, and

spread evenly. The trouble with the plain paraffin film has been that it spreads only moderately well, and also that the resulting film is often of uneven thickness, being in places rather bunched together.

Perhaps the greatest advantage which such an active film would show should be in the presence of reeds. In these it is well known that paraffin becomes almost useless unless carefully sprayed. To test this point as well as possible the following experiments were made. Paraffin was poured on to some water about six feet from a small clump of reeds. It penetrated the more open parts for a few inches and then stopped. Half an ounce of the mixture was then poured into the middle of the film in exactly the same spot that the paraffin had been poured originally, and in 75 seconds the whole clump was covered by a uniform film of oil. Again a quantity of paraffin was poured into a clear space in some reeds. It did not penetrate these appreciably except in one place where there was an opening. Into the middle of this a little of the castor oil mixture was then poured and immediately the whole film commenced to move outwards in every direction, encircling each reed closely as it went.

The mixture film is not only active, but also extremely tenacious. Perhaps the two properties are physically connected. If the film is broken by a stone being thrown into it, the rapidity with which the break is filled up is remarkable. When a wind is blowing over water which is raised in ripples an ordinary film will be seen to break very often on the top of each wave owing to the action of the wind. With the 1 per cent. film this is never seen with moderate breezes until the film has become extremely thin, certainly less than 1μ in thickness. The practical value of this tenacity is also shown by the following. Some paraffin was poured on to the surface of a fast little brook about a foot wide with grassy banks. It formed a film about a yard in length which then broke up and got entangled in the banks, and 15 yards below not a trace of oil could be seen. Into exactly the same spot an identical amount of 1 per cent. mixture was poured with the result that in half a minute a complete film covered the brook for the next thirty yards where the surface of the water was broken by an obstruction under which the stream flowed. This film had such a firm grip of the sides of the stream that it continued unbroken for five minutes, though of course, at the end of that time it was excessively fine, but showing its presence by most brilliant colours. The possibilities of such a film in oiling certain hitherto difficult places are immense.

Having left Palestine immediately after the castor oil had been tracked down, in order to be demobilized, I cannot so far give any results of the use of a castor oil mixture on a large scale. All the experiments described above have been performed since returning home, and although conditions in England are not entirely comparable to those in the Tropics, they certainly seem to suggest that the addition of castor oil has a very decided value which it would be well worth while for those actually engaged on anti-mosquito work on the spot to investigate and determine. Its value would at present seem to lie largely in three directions.

(1) *Greater Economy*.—A most important point in these days of oil shortage. There is little doubt that more oil is very often used than would give a sufficiently thick film to prevent mosquito breeding if it were uniformly spread. The greater spreading power of the castor oil mixture should enable a smaller quantity to be used with safety. Thus we calculated that in Jerusalem we could safely diminish the amount of oil used by 30 per cent. as soon as the castor oil method could be introduced. This was contemplating the use of a 1 per cent. castor oil mixture. The cost of the castor oil is very much more than covered by the cost of the oil saved. In most places it would not be necessary to use such a strong mixture, probably $\frac{1}{3}$ per cent. or $\frac{1}{4}$ per cent. would be ample for most places, but Jerusalem, from the mosquito point of view, abounds with difficulties and unusual features. If the hopes of the film proving effective in reeds should prove justified, economy will probably be obtained in many places by oiling instead of trying to keep the sides entirely free from reeds.

(2) *Greater Adaptability*.—Enough has already been said to show that a castor oil mixture should have a much wider scope than a plain paraffin. Its greater powers of penetration, its much more rapid spread, its greater resistance to being broken by wind action, &c., and also the fact that it will continue to spread in the teeth of a moderate breeze while the ordinary paraffin film is drifting steadily—all these suggest places in which oiling might successfully be employed where now it is impossible.

(3) *Greater Certainty of Action*.—As will be pointed out later, paraffin when poured into a pre-existing film will often hardly spread at all, or only very slowly. Thus in an undisturbed surface of water it is easily possible to have parts of a film much thicker than necessary while other parts are so thin that larvæ will develop normally under them. One might in passing mention that the addition of crude oil to paraffin which is sometimes made appears to very much increase this tendency to irregularity in thickness. The addition of castor oil on the other hand tends to make the thickness of the film much more uniform as well as increase the power of spreading in existing films.

There are certain great obstacles to the spread of films which must always be kept in mind if results are to be interpreted rightly, and it is therefore wise to mention them here. Perhaps one of the commonest is the presence of dust on the surface of the water. When oil is poured on such a surface it may spread quite well, but it will be found that in spreading it has pushed the dust surface before it, and the final position is merely one of equilibrium between the two surfaces. Add more oil, and the film will spread slightly more, but it will not cover the dust surface unless the film is very thick or violently agitated. In anti-mosquito work this dust surface remaining is always a potential danger.

The most difficult cause of films not spreading is the presence of soap or soapy material in the water. This becomes a very serious matter when dealing with cesspits, &c., and may often explain the fact why oil appears sometimes not to spread. The most minute trace of soap will prevent paraffin showing the slightest

tendency to spread; e.g., if a bath be swilled out after use and then filled with water there will often be enough soap remaining to prevent paraffin spreading at all. Castor oil decidedly diminishes the effect of soap but it does not by any means abolish it. As a matter of experiment a 6 per cent. emulsion of castor oil and paraffin will spread moderately well on a bowl of water in which one had washed one's hands, but the use of such emulsions would be difficult in practice owing to the fact that the castor oil would separate out.

A third very definite and important cause of films not spreading is the existence of oil or grease on the surface already. This is very marked and much complicates the matter of re-oiling places which have previously been oiled. It depends considerably on the kind of grease or oil present, but the effect of some oils is at least as great as that of soap in water. Pure paraffin dropped into the extreme edge of the very thinnest castor oil film refuses to spread at all, even though several ounces are so poured. On the other hand a pure paraffin film makes practically no difference to the spread of castor oil mixture dropped into it. In fact one may almost say that if the film contains a less proportion of castor oil than the mixture poured into it there is practically no hindrance to its spread. If they are the same in composition there is some delay in spreading, and this delay is increased the greater the difference in concentration between them if the film have the higher concentration.

The inhibitive influence of oil on the spread of oil appears to be related to the repugnance which oil films show to coalesce with one another. It is often almost impossible to get two separate films to unite into one, and this may at times be a point of practical importance, as experimentally I have observed larvæ living in the areas between two quite thick films. In confined areas one can note that a new film will have a marked repellent action on surrounding films, and when it is formed all these will diminish in size and may shrivel up into a mere drop again. Here again the addition of castor oil seems to improve the chances of two films coalescing provided they both contain castor oil, but fusion is usually slow in commencing. This point is of great practical importance if reeds are to be oiled, as the film streams through in many directions and it is essential that these should all unite to form one film and not a number of isolated ones.

There are doubtless many other subsidiary causes which prevent films of oil spreading, but the three mentioned appear to be the most important, and should always be considered if the oiling of any particular place or type of place is to be done in the most economical and satisfactory manner. They should help as a guide to the amount of castor oil which should be allowed if the least satisfactory amount is to be estimated. Thus in Jerusalem there is a considerable amount of soap in the cesspits, and the cisterns retain the oil so that a fair proportion of castor oil had to be allowed to make sure that the oil should spread fairly well. Had it been a reedy stream that was contemplated probably one-quarter the amount would have sufficed to show a similar superiority over plain paraffin.

These notes are not written with any idea of finality.

They merely record certain observations on the really remarkable effect of a small addition of one oil upon another. They do seem however to open up much greater possibilities in the use of films to exterminate mosquito. As such they have a vital interest for everyone interested in the cause of tropical hygiene, and call for further experiment and investigation in the field and in the laboratory. The former alone can show what practical value there is in such an addition as I have suggested, while for the latter there are a host of problems which await solution urgently. Why, for instance, is it that the addition of such a small proportion of castor oil has such an enormous effect? It is a purely physical phenomenon, and can other more efficient and cheaper substitutes take its place? Or is it some chemical constituent of the castor oil which might be isolated and prove immensely more powerful, and are there similar or allied substances which will produce similar results, or cheaper sources from which they might be obtained? Furthermore, are there yet other substances which might be added to the oil which would overcome the various difficulties such as dust, oil, &c., which still prevent even castor oil making paraffin into the ideal oiling fluid which is so much to be desired?

Such research is earnestly to be desired, but it is quite out of the scope of the present writer. It is hoped, however, that what has been written may lead to it being prosecuted with success, and may meanwhile be of service to those who are doing the practical work of keeping down the mosquito until the research workers shall put in our hands a yet more efficient weapon.

AN ORGANISM RESEMBLING *BACILLUS PESTIS*.

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ON December 23, 1920, a Widal tube of blood was sent here by the Resident Medical Officer, Lagos Hospital, to be tested for the typhoid group. The patient had only been admitted the day before.

The serum showed a complete clumping of *B. paratyphosus* B in a dilution of 1 in 30, and nearly complete 1 in 60. This agreed with the clinical symptoms and he was diagnosed accordingly. The patient died three days later and the Resident Medical Officer made a post-mortem examination. As the patient had had a rigor a few hours before death and the spleen looked somewhat unusual, it was ordered to be sent out for examination as regards malaria, paratyphoid, &c. It may also be stated that no ulcers were found in the intestine. Unfortunately the dresser in charge forgot to forward the spleen till the next morning. On arrival here it was found to be very diffident, very dark, with numerous dull red areas seen on cross section, which appeared to be either infarcts or hæmorrhages. (Further examination showed the spleen on section to be almost completely disin-

tegrated, very few cells being seen, only an albuminous ground substance, amongst which could be seen the bipolar bacilli.)

Smears were at once made and stained, using Leishman-Giemsa methylene-blue and Gram. Great was one's surprise on examining these to find the microscopic field full of bipolar round-ended bacilli. The Leishman film showed them up to better advantage. The organism was Gram-negative. Naturally one thought of the possibility of plague, especially so since the splenic appearance and acute illness to a considerable degree resembled septicæmic plague.

A guinea-pig was promptly scarified on the abdomen with the material and agar broth cultures prepared. When cultures had grown another guinea-pig was inoculated with 100 million living organisms. Both guinea-pigs are alive and well after seven days.

The following are the main characteristics of the organism found:—

Size and Form.—Varied from $\frac{1}{2}$ micron by 1 micron to less than 1 micron by $2\frac{1}{2}$ microns, usually seen singly, and occasionally small chains of three or four individuals were found.

In new culture preparations there was no polarity. The organisms being nearly all of one size, $\frac{1}{2}$ micron by 2 microns, and staining uniformly; but as the culture grew older this polar staining reappeared, especially if the stain were weak, although not to such a marked degree as seen in the spleen smears.

Motility.—The organisms were quite active.

Flagellæ.—One terminal, and occasionally two, flagellæ could be demonstrated.

Spore formation.—Nil.

Gram.—Negative.

Other stains.—Stained easily and readily with the ordinary aniline dyes. Was not acid-fast.

On Agar.—A greenish-yellow growth, tendency to be slimy, grew readily and thickly, the margin having a very feathery appearance.

On Broth.—Rapid growth. Turbidity and a pellicle quickly formed.

In Sugars.—Lactose, saccharose, maltose, glucose, mannite and dulcitol were quickly fermented, much acid and gas being produced and the fuchsin indicator rendered almost colourless.

On Potato.—A dirty, slimy, yellow-white growth, and the potato was blackened beneath the growth.

On Milk.—Acid quickly formed and clot towards the third day. The litmus indicator was rendered colourless.

Indol.—Nil.

Voges-Proskauer Reaction.—Negative.

Odour.—Distinctly fetid.

Resistance.—Easily killed at 60° C. for half-hour.

Virulence.—Nil to guinea-pigs.

Diagnosis.—It has not been found possible to place this organism. It does not compare readily with any of the intestinal organisms in Castellani and Chalmers' text-book. That the spleen was 24 hours old when examined suggests the possibility of its being an air saprophyte.

The fact that in this organism the polar staining

only appears as the cultures grow older, would seem to indicate that it results from the proteolytic or other fermenting qualities of the bacillus itself. The film showed to all intents and purposes the picture shown on p. 488 of "Muir and Ritchie's Bacteriology," seventh edition.

Conclusion.—All splenic bipolar round-ended bacilli are not necessarily the organisms of plague.

P.S.—On looking back through the records the statement is noted: "Lung exudate (sent from Kaduna—three days from here at the least."

"Numerous bipolar bacilli, rounded ends, vary somewhat in size, some in pairs—mostly single. Every precaution recommended."

Nothing happened in this case either.

It is obvious, therefore, that this organism must be borne in mind in stations where other bacteriological tests are absent.

Further Research in the Treatment of Hypertension (Leslie Thorn, *The Practitioner*, May, 1920).—The author comes to the conclusion that blood-pressure in cases of hypertension is always lowered by immersion in a Nauheim bath, whether the bath is of still or effervescent variety. The effect of the baths upon the blood-pressure differs materially according to the condition of the vessel walls; these baths are, therefore, useful in determining whether the hypertension is sclerotic or presclerotic.

Solitary Amœbic Abscess of the Liver (W. J. Mallory, A.M., M.D., *Journal of the American Medical Association*, vol. lxxv, No. 26, December, 1920).—The author, after a thorough investigation of this case, emphasizes the following points:—

Amœbic dysentery, and therefore amœbic abscess of the liver, may occur in persons who have never been in tropical or subtropical countries.

Amœbic abscess of the liver occasionally occurs a great many years after the primary and single attack of amœbic dysentery.

Amœbic abscess of the liver should be remembered as a cause of obscure fevers.

Hæmorrhagic Septicæmia of the Buffalo in Syria (Jean Verge, *Rec. Med. Vet.*, vol. xevi, No. 2, January, 1920).—Hæmorrhagic septicæmia does not appear to exist in certain parts of Syria, where very large numbers of buffaloes are kept, but in the Houlai Plains, where they are used instead of oxen for farm work, the disease exists as a deadly enzootic, which causes great losses amongst the herds at times. The disease usually starts at the end of the winter and continues throughout the spring, disappearing at the beginning of the following winter. This disease attacks animals of from 2 to 3 years old more heavily than adults or very young buffaloes.

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FAMINE IN CHINA AND THE CHINESE FLOUR ANOMALY.

NOTHING is so insurmountable for a medical man to contend with as scarcity of food amongst the community in which he practises his profession.

He feels his visits to be useless for the diseases which appear in his neighbourhood can only be alleviated by wholesome food in suitable quantity. The scarcity may be of milk, flour, maize, oatmeal or rice; potatoes and green vegetables; beef, mutton, or fowl. The scarcity may be of several or all varieties of food; the infant suffers from deprivation of its mother's milk, for if the mother is starved her milk disappears; and it cannot be supplanted by cows, mares, goats, or asses' milk, for the animals' milk disappears also. The flesh of animals loses its value, for the loss of fat from their tissues means a diminution in the heat-giving qualities of their flesh. Death and disease amongst animals further adds to the calamity.

The failure of grain crops is perhaps yet more serious than that of animal tissue or products such as milk, butter, or cheese, for it carries with it deficient food for animals and for man, and a vicious circle is set up which spells famine and disease to man and beast. Crops are affected in various ways; the season, whether drought or excessive rain and floods may bring disaster to the grain; diseases of plants, such as potato disease, parasitic attacks of maize and other seeds rob the community of their staple food; and the coffee plant, the grape vine, &c., have their specific diseases, due now to a parasitic insect now to a fungus. These are more or less inevitable catastrophes, although the means of abating them have been and are being fought out, but the struggle is a long one, and does not always promise success.

Of all the peculiar situations so far as history has revealed to us, there is a famine at present in the north of China, which, so far as report goes, is serious to a degree. Many, many millions are said to have perished for want of food. It is understood to prevail along the course of that great river which has been baptized "China's sorrow." The cause of this term is the floods that from time to time occur along the tract of the Yellow River. The low sandy banks of the waterway are insufficient to restrain the rise of the river floods, and the surrounding districts for scores of miles are flooded, crops are destroyed, and the soil rendered unfit for crop bearing for several years. Hundreds of thousands—nay, millions of people are drowned, and after the flood subsides their decaying carcasses pollute the earth, the water and the air. Nor is the evil thus created confined to the locality so devastated. It was held, and with some truth perhaps, that the great epidemic of influenza which went round the world in 1889 and 1890 was due to the widespread area involved in a great Yellow River flood just before the epidemic appeared. The geographical distribution and course of the 1890 epidemic of influenza carries at least circumstantial evidence—not, however, perhaps to be adjudged scientific proof—that the two circumstances and the pestiferous conditions prevailing in consequence of the flood—and the famine induced thereby—stood to each other as

cause and effect in bringing about influenza. The Italian word "influenza" means an influence, a "something" that seemed to be due to the influence of the air, and we have not advanced our knowledge so far as to justify the condemnation of the name and the belief that gave it baptism. That it encircled the world, starting from China, is true; that "Chinese" influenza reached Russia, and that "Russian" influenza found its way across Europe is also true; that ships in mid-Atlantic from Europe to America whilst in mid-ocean is a fact; and that influenza spread from East to West in America is also avowed. An epidemiologist of repute supported the idea that the focus of influenza was in China, and a well-known meteorologist declared that as the volcanic dust from Krakatowa remained in the atmosphere for three years after the eruption so the pestilential atmosphere over the Yellow River polluted area encircled the world as the earth rotated from West to East. But the matter in connection with China and famine is more involved. What are the facts? The north of China is afflicted by famine; the north of China is the only wheat-growing area in that empire; the Chinese are supplying Britain and perhaps other countries with "Chinese flour." Hitherto China has been an importer of flour, and of late years importation of flour for consumption has been rapidly increasing. Suddenly the opposite obtains, and Chinese flour is being brought to Britain in shiploads to such an extent as to flood the British millers with flour and forbidden by law to buy the British farmers' wheat, as the Chinese flour by command and interference of the British Government is supplied at a cheaper rate than the home-grown commodity. Where is the Chinese flour grown? Anyone who knows China is aware that only in the north is wheat grown in that country, but that is the area where the famine is; so that, paradoxical as it may appear, the food of the people is being exported from a famine-stricken country.

The British Government's bargain, made it is said some years ago, is thereby apparently taking the food from a famine-stricken country, and in consequence the people are dying in millions it is said from want of food. The result is that whilst the Chinese are suffering by their food being taken away, in Britain funds are being raised throughout the land to send to the district from which the flour is being taken away to fill our British mills and cause distress amongst British farmers.

What is this Chinese flour? What is its source? Is it Chinese or is it American? What is its quality? Is it only partly wheat flour, and therefore is termed "Chinese" to save face, thus qualifying it by saying "No one ever said it was 'flour' but only 'Chinese' flour." It is time this matter was explained and settled, so that from the British Government shall be removed the stigma attaching to the seeming anomaly, that whilst China is suffering for want of flour in its wheat-growing district, the fault lies at the door

of Britain, which is removing the food from a starving people, not to relieve distress in Britain, but to ruin the British farmer and allow the people of Britain to collect money to send to starving China, whilst the Government is importing Chinese flour to save their face and fill their coffers; so that whilst the public are sending money the farmers are being robbed of their earnings. Under the circumstances one begins to doubt the presence of a famine in China, and to ask is it part of a commercial corner or trust. The writer happens to know the medium through which the deal was made, but he (this merchant) cannot or will not state the source of the "Chinese flour."

This is a form of famine that is or is not manufactured, and doctors alone can be relied upon to find out the truth locally.

Not only is China starving in part, but the whole of Central Europe is on the verge of starvation or being imperfectly fed. To this circumstance may be attributed several or most of the anomalous ailments which at present are threatening Europe. Their signs and symptoms are peculiar, their causes are unknown, and their treatment purely empirical. Now it is "encephalitis lethargica," "cholera threatenings," "nervous complaints" of unfamiliar forms, "typhus," and others that as yet have received no name. It may be said that we have, and will have for several years, to deal with new phases of disease. But if the ailments in question are due to insufficient or adulterated foods, the doctors must speak out and not be content with merely "relieving symptoms as they arise"; their help in this direction will be for the general good.

Commercial relations, economy in the interests of State and of political adventures, cannot be allowed to silence the doctors' findings. If they are to be silenced by such interests, then as a profession the medical men will be to blame and held up to obloquy as time-servers. This is an accusation that has seldom or ever been laid at the door of medical men, and it is to be hoped that they may continue to keep their escutcheon clean and undefiled, be the interests of politics what they may.

J. CANTLIE.

An Epidemic of Ropy Milk (H. A. Harding and M. J. Prucha, III. *Agric. Exp. Sta., Bull.* 228, 1920).—An epidemic of ropy milk occurred in the cities of Illinois during June, 1919. On examination the ropy milk organism was found in the milk delivered to a bottling plant, which led to the general examination of the individual dairies. The organism was commonly found in the farmers' utensils, and in the water from the cooling tanks. At one farm where this occurred the overflow from the cooling tank was used for watering the stock. The conditions about the stock stand were such that the cattle got water and mud on their coats, material from the flanks and udders of which caused ropiness in sterile milk. Complete elimination of the trouble is very difficult, but proper pasteurization greatly decreases the danger.

Annotations.

Further Studies on the Specificity of Streptococci (Ruth Tunnicliff, M.D., *Journal of the American Medical Association*, vol. lxxv, No. 20, November, 1920).—The serum of a sheep immunized with hæmolytic streptococci from the throat in the acute stage of scarlet fever protected mice against cultures of hæmolytic streptococci isolated from scarlet fever patients, but not against hæmolytic streptococci from other sources, such as erysipelas, mastoiditis and influenza.

This anti-streptococcus sheep serum rapidly lost its opsonic and protective power, which was restored by the addition of fresh normal sheep serum.

These experiments, together with the opsonin and agglutinin reactions, give additional weight to the conclusion that the hæmolytic streptococci from the acute stage of scarlet fever form a distinct biologic group, apparently peculiar to scarlet fever.

Relation between Lactic Acid Production and Bacterial Growth in the Souring of Milk (J. C. Baker, J. D. Drew, and H. J. Conn, N.Y. Agric. Exp. Sta. (Geneva), *Technical Bull.* 74, 1919).—Bacteriological and acid determinations were made hourly in two experiments in the souring of milk with a pure culture of lactic acid organism. Six other experiments were also made, but they were less extensive. Both microscopic and plate counts were made to determine the numbers of organisms, but the microscopic counts were used in the computations, as these were felt to be more nearly correct. In one experiment the bacteria were found to multiply, while in the other the multiplication lagged behind. The rate of acid production varied greatly, decreasing as the curdling point was approached, lying between 5 by 10 and 10 by 10 mg. lactic acid per hour.

Toxic Effect of Large Doses of Beta-naphthol (W. Rose, *International Health Board. Sixth Annual Report*, 1920).—Although in the experience of Bayma and Alves and of Gonzaga and Lima, 18-grm. doses of beta-naphthol proved practically non-toxic, Smillie conducted further experiments in Brazil during 1919, which showed that under certain conditions beta-naphthol in large doses may produce severe toxic symptoms. In the case of four patients who received 18 grm. of the vermifuge, red blood cells were destroyed in great numbers, with resultant severe anæmia, icterus, hæmoglobinuria, and enlargement of the spleen, liver and gall-bladder. The white blood cells apparently were not destroyed by the drug. The liver, spleen, and kidneys and other organs of the body were not affected primarily, but were markedly affected secondarily, because of the anæmia and the injurious effects produced by the

elimination of large numbers of destroyed red blood cells: In three of the severe cases of poisoning, however, there was a history of recent malaria. It may be that persons whose red blood cells have been rendered fragile by recent attacks of malaria are more sensitive than others to the toxic action of the drug.

Malaria in England, with Special Reference to the Role of Temperature and Humidity (Brevet Lt.-Col. C. A. Gill, I.M.S., D.P.H., D.T.M. & H. *Journal of Hygiene*, vol. xix, No. 3, January, 1921).—The author comes to the following conclusions:—

The study of the meteorological circumstances prevailing in the United Kingdom confirms the conclusions reached in India that the combined influence of temperature and humidity plays an important part in determining the conditions necessary for the transmission of malaria.

The part assigned to temperature and humidity points to the conclusion that the period of active infection in England is ordinarily limited to the months of July and August.

The part attributed to temperature accounts for the geographical distribution of the endemic area of malaria in the British Isles, and explains its limitation to certain parts of England.

The combined influence of temperature and humidity appears to afford an explanation of the precise location of the endemic centres of malaria within the above area.

The parts assigned to temperature and humidity elucidate certain points in connection with the epidemiology of malaria in England, and it offers an explanation of the conditions known as "Malaria sine Paludism and Paludism sine Malaria."

The part played by the meteorological factors throws light on the past history of malaria in England, and it helps to explain its gradual decline.

Preservation of Stock Cultures of Bacteria by Freezing and Drying (Homer F. Swift, M.D., *Journal of Experimental Medicine*, vol. xxxiii, No. 1, January, 1921).—The author calls attention to the fact that bacteria may be preserved for a long time by desiccation in the frozen state. It has been shown that until desiccation is complete the frozen condition should be maintained as the organisms are killed if the fluid melts before the moisture is completely removed, probably because of the concentration of the salts upon the surface of the bacteria. The organisms can be kept in a frozen state by immersing the tubes in glycerol contained in a desiccator, and subsequently keeping the whole apparatus in a salt-ice mixture until the drying is complete. If bacteria are kept in this way they retain their cultural, biochemical and immunological characters for a prolonged period of time.

Prophylactic Inoculation against Yellow Fever (Hideyo Noguchi and Wenceslao Pareja, M.D., *Journal of the American Medical Assoc.*, vol. lxxvi, No. 2, 1921).—The authors come to the conclusion that if sufficient quantities of killed culture are given in the vaccination of guinea-pigs, these animals are usually rendered resistant to a subsequent infection with *Leptospira*. The degree of protection, however, is not strictly proportional to the amounts of the vaccine inoculated. With the vaccination of human beings, the results up to the present have been very encouraging, but a final decision of its value has yet to be arrived at.

Hookworm and other Intestinal Parasites in Ecuador (E. Ray Royer, M.D., *Journal of the American Medical Association*, vol. lxxv, No. 25, December, 1921).—The author states that hookworm is very prevalent in Ecuador. Both the Old and the New World varieties are found there. Its eradication has not been attempted except in a few small areas.

Trichocephalus dispar and *Ascaris lumbricoides* are found in a large percentage of the population, and diarrhoea and subsequent anæmia are not unusual sequelæ.

Chenopodium oil has proved more effectual in the removal of intestinal parasites, with the exception of *T. dispar* and the tapeworm family, than the older vermifuges. The former has been found more resistant to treatment than other species, and neither chenopodium nor other vermifuges or anthelmintics seem to exert a marked influence on their removal or destruction.

The fact that oil of chenopodium acts as a vermifuge on other classes of parasites is an economical factor in its favour, saving in many instances the necessity of administering other drugs for their removal. The older method of treatment in Curipamba hospital consisted in the administration of santonin and calomel for the removal of other classes of intestinal parasites, previous to the chenopodium treatment, but that procedure has been found superfluous in the eradication of *A. lumbricoides* and *strongyloides*.

Untoward symptoms and toxic action ascribed to the use of chenopodium oil are due, in many instances, to improperly selected cases. Each patient to whom the oil is administered should come under the observation of the prescriber, and dosage determined after a physical examination.

A classical symptom often mentioned in textbooks as occurring in hookworm disease, i.e., a triangular spot, or spots, on the dorsum of the tongue, appearing as though a pen had been wiped on it, is of little value as a diagnostic sign. In the series of cases reported, this sign was not observed in a single instance.

Is there a specific toxin generated in pulmonary tuberculosis which is inimical to the development of hookworm in a host so affected? An interesting feature, and perhaps an unusual one, was the fact that while the initial survey of employees revealed

an average infestation of 58.66 per cent. with hookworm, in forty-six cases of pulmonary tuberculosis, hookworm infestation could not in a single instance be demonstrated, though the pulmonary condition apparently exerted little influence on other species of parasites, which were present in about the usual number. This may be merely a coincidence, but it is certainly worthy of further investigation, as a review of the available literature on either hookworm disease or tuberculosis gives no enlightenment on the subject.

Abstracts.

THE PROPHYLAXIS OF MALARIA IN DAR-ES-SALAAM, EAST AFRICA.¹

By Lieutenant A. W. J. POMEROY, M.B.E., F.E.S.

THE DESTRUCTION OF THE IMMATURE STAGES OF MOSQUITOES BY MEANS OF OILING THE SURFACE OF THE WATER.

As the larvæ of anopheline species of mosquitoes must come up to the surface of the water to breathe, a mixture of oil of the right surface-tension, sprayed over the water, forms a film which clogs the breathing tubes and causes the death of the larvæ from asphyxiation. The best mixture was found to be half crude oil and half kerosene.

The surface-tension of the oil used is a very important point; too heavy a mixture of oil will only cause congealed masses and a very thin and volatile film, resultant from the lighter constituents of the oil.

The use of unmixed commercial kerosene will produce a thin film of too volatile a nature.

The ordinary pump sprays used for disinfection purposes do very well for distributing the oil, especially if fitted with a Vermorel nozzle.

Short hand sprays are very useful for work on cesspools and drains.

Difficulty is often encountered in successfully oiling water, the surface of which is strongly agitated by wind. The oil film is often blown into the sides, leaving large uncovered spaces.

The following experiment was tried, which proved quite successful on a small pond: Frames were made of the dried stems of the sisal plant, lashed horizontally, and laid on the surface of the water, dividing it into squares. This prevented the entire film of oil being driven to the sides.

The use of oil on cesspools and wells is a far better method of destroying larvæ than chemicals or disinfectants, as only a very small quantity of oil is needed, and in the case of wells the water is not affected as regards its use for drinking and washing if the intake is below the surface, so as not to disturb the surface film of oil.

THE USE OF "TOP" MINNOWS AND OTHER FISH AS A METHOD OF CONTROLLING THE IMMATURE STAGES OF MOSQUITOES.

The use of fish as a method of destroying larvæ was found to be most effective.

Actual experience showed that indigenous minnows destroyed enormous numbers of larvæ, and that if the vegetation was properly cleared, allowing access to the entire periphery of water, very little breeding ensued.

There must be an ultimate balance attained between the increase of the larvæ in their natural state and their destruction by the fish; but any preponderance in the increase of the larvæ seems to be due to the fact that they are able to escape capture amongst the aquatic vegetation, which prevents the fish following.

It was found that if the drains were kept clear the fish travelled the entire length, and in such cases the writer was invariably unable to discover any larvæ existing.

In addition to the minnows, fish of the genera *Gobius* and *Electris* very readily devoured all larvæ which descended to the bottom of the water, and doubtless many other fish play a very important part in the control of mosquito larvæ other than the "top minnows."

On a shortage of oil occurring, it was found necessary to employ an alternative method with regard to tanks and house cisterns.

Various species of small fish were captured and kept in tanks for a week or more without food. They were then transported in wooden buckets and placed in the infested tanks. In an astonishingly short space of time they had completely destroyed all larvæ. The period varied from twelve to twenty-four hours.

Six fish were able to cope with a heavily-infested tank of an average capacity of 200 cubic feet.

The fish were then re-caught and returned to the stock tanks. In the case of ornamental ponds in the Botanical Gardens, fish were introduced, and contrary to expectations, instead of any decrease in numbers being observed, in six months' time they had increased. On no occasion after the introduction of fish to these ponds was there any evidence of larvæ existing.

Dr. Spurrier who was previously in charge of the anti-malarial work in Dar-es-Salaam, imported a small number of fish from Zanzibar and the Seychelles, and also tried some experiments with local fish.

The local species, however, proved quite as effective as the imported species without the extra expense of transportation being incurred.

The species of fish used were plentiful in all fresh water streams and even in the brackish water in Gerrassani Creek basin.

The following list is given of the species of fish in the Dar-es-Salaam region found to be the most effective for practical work as larvicides. The species were determined by Mr. G. A. Boulenger, F.R.S., F.Z.S., to whom the writer wishes to express his

¹ From the *Journal of the Royal Army Medical Corps*, vol. xxxv, July, 1920, No. 1.

thanks: *Tilapia nilotica*, L.; *T. ovata*, Strd.; *T. natalensis*, M. Web.; *T. mossambica*, Peters; *Electris fusca*, Bl. Sohn.; *Gobius*, Ham. Buch.; *Fundulus guentheri*, Pfeffer; *Ambassis commersoni*, C. and V.; *Mugil macrolepis*, A. Smith.

EXPERIMENTS WITH REPELLENT CHEMICALS USED AS CULICIFUGES.

At the request of the medical authorities at the War Office, experiments were undertaken to ascertain the value of certain chemicals to be used on the human body as repellents against the attacks of mosquitoes.

The results are set forth in the appended tabulated forms. The species used in the experiments were *Stegomyia fasciata* Fabr.; *Culex fatigans*, Wiedemann; *Pyrethrophorus costalis*, Loew. Some considerable difficulty was experienced in keeping the adults alive for a sufficient period. The first cages were made of glass. These were unsatisfactory and finally the difficulty was overcome by making the cages with fine tulle, with glass tops, for the purpose of observation.

The actual biting experiments were carried on as follows:—The adults were transferred from the breeding cages to large cages about two feet long and one foot in diameter, made of thin slips of tin covered with fine netting, with a sleeve at one end. Two of these were used as a control and one for the culicifuge.

The mixture was rubbed on the right arm of a native, who then extended his arm and inserted it into one of the cages, while at the same time another native placed his arm in the control cage, about 16 ft. away in the same room.

The behaviour of the mosquitoes was very carefully watched. Great care was taken to have the adults all of the same age in order to get uniformity of desire.

Freshly emerged adults do not exhibit much desire to bite. The presence of males seems to be an incentive to bite and copulation usually took place among the adults used before they were transferred from the breeding places.

Owing to the fact that an experienced chemist could not be specially detailed for the work, some difficulty was found in getting the components to mix, such as cinchona, sodium sulphate and water.

Some experiments were carried out on the legs of a European, the legs being placed wide apart, one in each cage. There did not seem to be any difference in the attraction of a native or a European as a subject.

The results were tabulated on specially printed forms. This was done in order to secure uniformity.

Some of the mixtures used were very effective in warding off the attacks of mosquitoes, but so nauseating in their odour as to be of no practical value. Bamber oil was effective, but it has a very clinging and to some people a most sickening odour. Other good mixtures as cinchona, peppermint oil and vaseline are so greasy as to be very objectionable in addition to the unpleasant smell.

It would appear that one of the mixtures used, Mixture No. 2 (oil of peppermint 1 part, oil of cinnamon 1 part, vaseline 2 parts), was almost chemotropic in its action, actually attracting and stimulating

efforts towards biting, though so overpowering as to cause suffocation and death.

In conclusion it seems an open question whether culicifuges are of real value, except possibly under exceptional circumstances. Firstly, owing to the fact that even the most successful preparations have an odour that is so unpleasant after continued application that great difficulty will be found in enforcing their use, and secondly, that the use of culicifuges may tend towards the disregard of the proved remedial measures, viz., the use of mosquito nets, regular prophylaxis by quinine and the elimination of the carrier, the anopheline mosquito.

The best mixture as regards efficiency in warding off attacks of mosquitoes, and which has neither too unpleasant an odour nor is too greasy and irritant, is Mixture No. 10: soft soap 1 oz., paraffin 20 c.c. eucalyptus oil 20 c.c.

THE RESULTS OF REMEDIAL MEASURES.

In 1917 the percentage of troops in Dar-es-Salaam suffering from malaria was very heavy, especially in the Main Detail Camp at Gerrassani and the Prisoners of War Camps.

Why such sites had been selected for the main bodies of troops and Europeans remains a mystery to any one with even an elementary knowledge of tropical sanitation and hygiene as regards mosquitoes.

These camps were situated on the most dangerous areas, away from the seashore, inland, and overlooked many small, slow moving streams and reed swamps.

The faulty position of these camps was remarked upon by Major-General Pike and Lieutenant-Colonel Balfour when their Commission visited the places.

There was a large area within easy transport distance of the railway, but near General Headquarters, all along the sea front, which was almost free from anopheles, with only one very small swampy area. This was used for the Army Veterinary Corps and the Horse lines.

The European officers in charge of the Prisoners of War Camp seldom lasted more than three weeks, invariably going down with fever.

The tents swarmed with anopheles before the adjacent valley was drained, and even after great effort was made to keep the area under control it was impossible to entirely eradicate anopheles, as was done in the main portion of the town along the seaboard.

Finally in 1918 the bulk of the European Details were removed to camps along the sea-shore. But a considerable amount of sickness could have been avoided if experience and knowledge had been used in selecting sites in the first instance.

Early in 1918 about fifty European nurses and sisters arrived in Dar-es-Salaam. Of these, so I was informed by Lieutenant-Colonel Kidd, A.D.M.S., only two went down with malaria after seven months. They were living in the free area in the centre of the town. There was a possibility in this instance of one of the two cases having had a previous infection.

This was a very different story from the events of

1917, during which period I believe I am correct in saying that actually 70 per cent. of the troops of some units, stationed in Dar-es-Salaam, were on the sick list suffering from malaria. A mosquito survey was made in 1917 by Dr. Aders, who sent in a report to Headquarters. His services were lent by the Zanzibar Government, but he returned to Zanzibar after making his report.

Some excellent preliminary work was done by Dr. Spurrier, C.M.G., O.B.E., who was also lent by the Zanzibar Government. He received however very inadequate support both as regards personnel and equipment.

He informed me that he found great difficulty in obtaining facilities for the work, which no doubt was partly due to the fact that he was a civilian in military employ. I wish to express my thanks to him for the kind way in which he placed all the knowledge he had gained at my disposal.

After serious efforts towards prophylactic measures were undertaken by the writer in 1918 against mosquitoes, the opinion expressed to me by the Medical Command in Dar-es-Salaam was that there had been a very appreciable decrease in the cases of malaria originating in Dar-es-Salaam, and that the money, time and effort was very well repaid in the consequent efficiency of the troops.

The general public opinion seemed to be that the numbers of mosquitoes had been greatly reduced and that there was no doubt of the great improvement in the situation from 1917 to 1919. Many units who were stationed in Dar-es-Salaam stated that the mosquitoes were almost unbearable in 1917, while in 1919 there was little inconvenience except from a few isolated cases of infestation by *Stegomyia fasciata*, due to the German system of underground drainage which was so difficult to cope with.

THE DIAGNOSIS OF HUMAN PLAGUE.

By C. L. WILLIAMS, M.D.

TYPES OF THE DISEASE.

PLAGUE occurs in four forms, only one of which far exceeds the others in importance. They are, in order of frequency and importance to the American physician, bubonic, pestis minor, septicæmia and pneumonic. Of these, bubonic is far and away the most important to us, since it is the type that is most likely to occur in this country. Recently there has been a small outbreak of pneumonic plague in one of our Western cities, and it is realized that should another such outbreak occur and get beyond control, a fearful epidemic might ensue; but the chances of this are regarded, on good grounds, as remote compared with those of bubonic cases making their appearance.

BUBONIC PLAGUE.

There are three principal symptoms of this type of plague, and one clinical sign, surely a small array to remember. The symptoms are sudden onset, rise of temperature and marked prostration. The sign is the bubo. The onset is usually quite sudden, the patient feeling well in the morning, say, and very sick before the end of the day. At onset frequently appears mental haziness and disordered motor co-ordination resembling similar conditions in some stages of alcoholic intoxication. A chill is quite common. The temperature varies from 100° to 106° F., with 102° as the average.

Prostration is as marked as in severe influenza, or more so; on the fourth or fifth day of the disease the patient is apt to be semi-comatose and limp as a bag of meal. These signs may vary in degree, cases sometimes being seen which merge into pestis minor. The usual picture is that of a very sick man with temperature of 102° or thereabouts, who complains of a bubo. Minor symptoms are full but rapid and compressible pulse, injected conjunctivæ and flushed skin. The important point is the association of these symptoms with a bubo. The plague bubo is characteristic.

The bubo, nine times out of ten is femoral and virtually always on one side only. Occasionally axillary buboes occur due to infection through flea bites on the hand or forearm, and very rarely the glands of the neck are the ones affected. Since, however, the rat flea usually bites man on the lower portion of the leg, we find that scarp's triangle on one leg or the other is the site of election. It is not to be inferred from this that the inguinal glands above the bubo are normal. Far from it, as a rule; but usually a glance is enough to determine that the main mass is below Poupart's ligament, although a lesser swelling frequently appears above it.

The bubo has four main characteristics. It appears coincidentally (approximately) with the onset of the disease; the swelling is caused by infiltration of the tissues with fluid at least as much as if no more than by enlargement of the glands; the skin immediately over the bubo is hot and red; and the mass exceedingly tender and painful to the touch. The bubo is an entity, not a string of enlarged glands, but a mass of acutely engorged necrotic glands embedded in gelatinous inflammatory tissue. It appears suddenly, and does not suppurate until a week or two after the onset, if at all.

Unlike venereal buboes, it shows a broad, flat surface, seldom coming to a point. When seen within the first three or four days, the individual large glands can be made out, thereafter the infiltrated tissue toughens and only a large, hard mass is palpable.

Minor signs are palpable spleen, large liver, and occasionally the presence of a blister or "phlyctenule" on the extremity carrying the bubo. The last occurs only in about 5 per cent. of cases, but should always be searched for because, if found, it renders diagnosis exceedingly easy, smears from the contents revealing the typical *Bacillus pestis* in tremendous numbers. These phlyctenules resemble blisters with turbid con-

¹ Abstracted from the *Journal of the American Medical Association*, vol. lxxv, No. 6, August 7, 1920.

tents: they vary from one-half inch to an inch and a half in diameter.

PESTIS MINOR.

Pestis minor is the mild form of bubonic plague. It differs from the description above in lacking a sudden onset and prostration; fever is usually present for two or three days, with general malaise. The bubo is quite characteristic, but is likely to develop more slowly. These cases are usually seen late, when the bubo is hard and only moderately tender, when patients usually recover, the bubo being slowly absorbed, occasionally suppurating. Cases in which the patients do not recover pass into the more severe type.

SEPTICÆMIC PLAGUE.

This is the type in which there is an overwhelming infection of the blood, with death in three or four days, without the appearance of buboes. It need not be considered at any length here, for the reason that its diagnosis without previous knowledge of the existence of plague in the community is hardly to be expected. All that the physician sees is a patient who has suddenly been taken very ill, and who dies without showing any definite evidence of what ails him. At necropsy it can be diagnosed definitely if smears and guinea-pig inoculations are made from liver and spleen.

PNEUMONIC PLAGUE.

In pneumonic plague, we have a relatively rare form of the disease which, however, being directly contagious, is highly apt to become epidemic when it does appear, and with disastrous results. It is unlikely to occur in the southern cities, but from San Francisco and Norfolk on the two coasts north it must be borne in mind as a possible menace.

Primary pneumonic cases seldom occur in warm climates, since for direct droplet infection of the respiratory passages it has been definitely shown that conditions preventing even moderately rapid drying are necessary. For example, the great epidemic of pneumonic plague in Manchuria was associated with tightly closed native homes and a severely cold winter, while in India, where pneumonic involvement from axillary buboes is not uncommon, primary pneumonic infection of attendants on such cases is rare.

Plague pneumonia differs from other forms of pneumonia on three points: After sudden onset, the patient is extremely prostrated with almost no chest signs: by the time definite involvement of the lungs is demonstrable, the patient dies. The sputum is watery, never thick and tenacious, and soon becomes very bloody: the sputum contains typical *B. pestis* in large numbers. Pneumonic involvement occasionally supervenes in bubonic cases.

BACTERIOLOGICAL DIAGNOSIS.

Plague is one of the few diseases which can be absolutely diagnosed by the bacteriologic findings. Any case still showing well-marked signs or symptoms can be positively shown either to be plague or not plague by proper laboratory methods. *B. pestis* can always be found, if it is present.

PROCEDURES FOR RECOVERY OF THE ORGANISMS.

In bubonic plague and pestis minor, the organism is obtained by inserting the needle (19 or 20 gauge) of a syringe into the bubo, going into a gland, if palpable, and aspirating some of the gland juice. One or two drops is usually all that can be aspirated, but this amount is quite sufficient. Most of this is used to make smears, after preparation of which 1 or 2 c.c. of salt solution, or just water, are drawn into the syringe, shaken up a bit, and portions of it injected subcutaneously or intraperitoneally into two guinea-pigs. In 90 per cent. of cases of plague the characteristic bipolar bacilli will appear in the smears; in 99 per cent. of cases one or both of the guinea-pigs will die within ten days, showing the characteristic injection: bubo, large liver and large, granular spleen, with the bacilli present in large numbers in smears.

Intraperitoneal injection causes earlier death of the guinea-pigs, but without the appearance of bubo or markedly granular spleen. It has the advantage of speed and the appearance in the peritoneal exudate of a practically pure culture of *B. pestis*.

In suspected septicæmic plague, 3 or 4 c.c. of blood is drawn, thick smears made and guinea-pigs inoculated. In only a few of these cases will the smears be positive, but the guinea-pigs are quite reliable, having been proved susceptible to as few as three or four bacilli.

In pneumonic plague, *B. pestis* is present in ever-increasing numbers in the sputum. Guinea-pigs should be inoculated for production of the characteristic lesions in all cases, since the microscopic appearance, except to the eye of an experienced observer, is not a reliable guide.

In preparing smears they should be made reasonably thin. After drying in air they should be fixed by passing once or twice through a flame and then stained with carbolfuchsin, carbolfuchsin or Loeffler methylene blue, preferably the former when obtainable, since it brings out best the bipolar staining. The plague organism is a relatively short, thick, rounded end or oval bacillus. When it is present in smears from tissues at all it usually occurs in considerable numbers; a diagnosis should never be based on two or three bacilli. Smears showing *B. pestis* have three principal characteristics. The bacilli are lightly stained, and a considerable proportion of them show distinctly heavier staining at the two ends, shading down to the central portion, which is almost completely clear (the proportion of bipolar-stained individuals varies very much in different smears, but is almost never 100 per cent.). The individuals vary markedly in size from short coccobacillary and round coccoid forms to rods two or three times as long as wide, with all intervening sizes. There is no particular arrangement, chains are not formed, and individuals do not lie parallel. In smears from human buboes it is not unusual to find plague bacilli inside of phagocytes. When any case suspected of plague infection has progressed to the point of finding what are believed to be specific organisms or suspicious lesions in

guinea-pigs, it should be reported to the proper health authorities as a suspicious case, the absolute determination of the specificity of the organisms, which is a somewhat complicated procedure, being placed in the hands of a competent bacteriologist.

POST-MORTEM APPEARANCE.

The post-mortem appearance of human cases differs somewhat in the various types, except that in the bubo and hæmorrhagic pneumonia there are no very marked gross lesions. The bubo cannot be "shelled out," but must be dissected out. On section it shows the large hemorrhagic, necrotic or caseous glands embedded in a mass of blood-stained more or less gelatinous inflammatory tissue. Only the glands themselves are necrotic. The viscera show marked enlargement and congestion of the spleen and liver. Smears from spleen, liver and bubo show *B. pestis* usually in profusion. In plague pneumonia, large areas of hemorrhagic, necrotic consolidation of the lungs appear with plague bacilli in great numbers. Guinea-pigs should always be inoculated for confirmation.

A METHOD FOR FIXING FILMS OF HUMAN BLOOD CELLS DURING THE AMÆBOID MOVEMENT OF LEUCOCYTES AND THROMBOCYTES.¹

By M. A. VAN HERWERDEN, M.D.

IN human blood films fixed in the usual manner, the amœboid movement of leucocytes and thrombocytes is lost. I have therefore endeavoured to obtain a simple method to retain this movement in the fixed specimen. Of course, this is possible only by very quick fixation at body temperature, while the cells are in an environment which does not hinder normal motility. The following method gives excellent results.

A watch-glass, covered by a second watch-glass, on the inside of which is laid a filter paper moistened with water, is placed in an incubator at a temperature of 38° C. On a well cleaned cover-slip is placed a drop of Deetjen's solution (0.75 per cent. sodium chloride, 0.5 per cent. manganese sulphate, 0.001 per cent. sodium bicarbonate), previously heated to body temperature, to which is added a very small drop of blood from the finger. This cover-slip is placed in the space between the watch-glasses, which is kept moist by the wet filter paper. After about 20 minutes in the incubator the covering watch-glass is quickly replaced by another one, on the inside of which a filter paper is placed moistened with a solution of 40 per cent. formaldehyde. In this manner the leucocytes and thrombocytes which have continued their amœboid movement, while in the damp space, are quickly fixed at body temperature. After about half-an-hour the cover-slip is taken out of the incubator and the mixture

of Deetjen's solution and blood is carefully run off so that part of the red blood corpuscles, leucocytes, and thrombocytes are left adhering to the cover-slip. The film can now be stained and treated further in the usual way. The best results are obtained if the film is stained while still wet.

In this way well fixed films are obtained. For the thrombocytes, Deetjen's solution is preferable to Ringer's solution, but often good results are also obtained with the latter. The finest amœboid projections of the multinuclear leucocytes as well as those of the mononuclear leucocytes are visible. There is sometimes a radiation of protoplasm around the nucleus of the lymphocytes; the other leucocytes are very irregular in shape. Moreover the change of shape of the nuclei during the amœboid movement of the cell, seldom visible in the living specimen, can be studied in this way.

Comparison of the size of amœboid leucocytes with that of equally well fixed red blood corpuscles makes it evident that the impression ordinarily obtained of the size of these bodies is most incomplete. This is also true of the thrombocytes. In films made by the method described, the latter generally are of various sizes and shapes. Thrombocytes are found which are as large as red blood corpuscles: others again are much smaller, but also with amœboid projections. The nucleus is scarlet if stained according to Romanowsky's method; it is dark or light blue after being stained in hæmatoxylin for 24 hours; but it is most distinct if stained with Heidenhain's iron-hæmatoxylin. By the last method all grades of transition from small pycnotic to large pale nuclei can be observed. In some of the thrombocytes small basophil granules are given off by the nucleus, or the latter is entirely split up into granules. Among the numerous thrombocytes examined I have never been able to distinguish a mitotic division; in some films a constriction and doubling of the nucleus have been seen. In the latter case, probably cell division was about to take place.

In films prepared in this way one can study the position of the mitochondria in the amœboid leucocytes, especially if after being fixed with formaldehyde they have been left for a few days in a solution of three per cent. potassium bichromate and have been stained in Heidenhain's iron-hæmatoxylin (method of Regand). Sometimes mitochondria and chondriocontes continue into the cell processes.

The method described above demands, beyond careful treatment, so little technical practice that it can very well be carried out by students during practical work.

It may also be interesting from the clinical point of view to observe leucocytes and thrombocytes in their natural shapes, and perhaps to examine the behaviour of blood parasites by this method. The method also permits a study of the influence of different substances (poison, &c.) upon amœboid movement. For instance, it has been noted that an isotonic solution of potassium chloride and sodium chloride, if used instead of Deetjen's solution, allows the amœboid movement to continue (treatment for one hour.) The same result is obtained with 0.001 N phenylurethane (in Deetjen's

¹ Abstracted from the *Journal of Experimental Medicine*, vol. xxxii, No. 2, August 1, 1920.

solution), while the same narcotic in a concentration of 0.001 N inhibits mortality in less than one hour. These are only a few examples of the observations made.

This method has also been used to study the influence of radium radiation on the mortality of leucocytes. On the cover-slip that is to carry the drop of Deetjen's solution and the drop of blood is placed a ring of paraffin about 2 mm. in height to support the radium capsule. A control specimen, prepared in like manner, is covered by a second cover-slip, instead of by the radium capsule. The rest of the procedure has been outlined above. The radium capsule used for the experiment contained 3.1 mg. of radium bromide under a mica cover. The blood mixture irradiated with this for 8 hours at body temperature contained several leucocytes which had kept up their amoeboid movement. The same intensity of irradiation kills the eggs of *Daphnia pulex* in a much shorter time (generally a few minutes) as demonstrated in a former paper.

In conclusion it may be mentioned that by this method it might be possible to obtain a better view than has hitherto been possible of the morphological changes of thrombocytes during coagulation of the blood.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.

No. 8, October 13, 1920.

Treatment of Epizootic Lymphangitis (G. Curasson).—After a consecutive experience of nine years in Morocco, France and French West Africa, Curasson has come to the conclusion that epizootic lymphangitis varies so much in its manifestations and gravity according to the latitude and season of the year that none of the methods in use can be applicable to all cases. He considers that when the lesions are not too extensive cauterization gives better results than the more modern remedies; potassium iodide is effective but slow, and may give rise to phlebitis; galyol is efficacious when accompanied by cauterization; pyrotherapy would seem to be useful in combination with local treatment of the lesions; bi-iodide of mercury produces good effects when used locally but not when injected into the muscles; irrigations of Dakin's solution are ineffective; tincture of iodine in association with mercurial ointment is often useful in mild cases; and perchloride of iron produces the same satisfactory results as the cautery with less brutality.

Leprosy at Rodriguez (S. E. Maugenie).—The author pleads for Government measures to isolate lepers in the island of Rodriguez. He has traced the disease to its original source in a native of Mauritius known as "Diango," who emigrated to Rodriguez half a century ago and developed leprosy

about five years later. There are now twenty-three cases in the island, all of whom are the direct descendants of "Diango."

Phlyctenular Conjunctivitis and Pediculosis (Georges Blanc).—An emulsion of lice and their excreta taken from the scalp of a young Arab suffering from phlyctenular conjunctivitis was applied to the left eye of a monkey. Microscopical examination of the emulsion revealed nothing particular. More than two months later a typical phlyctenular conjunctivitis developed in the eye of the monkey. The author contrasts this experiment, together with a large experience of cases observed in France, Tunis, Athens and Crete, with the evidence collected by Parrot in Algeria tending to show the absence of relationship between phlyctenular conjunctivitis and pediculosis.

Spontaneous Spirochaetosis in the Domestic Duck (L. Parrot).—A four-months-old duck living in a fowl-house with other ducks and a number of cocks and hens died after six days' illness; the symptoms and autopsy findings suggested a spirochaetosis but no microscopic examination could be made. Four days later a three-months-old duck (female) was found to be suffering from the same symptoms. Examination showed numerous spirochaetes. Two days later the blood was negative and the bird recovered. A three-months-old chicken was inoculated with 0.5 c.c. of blood from the infected duck without result. None of the other inhabitants of the fowl-house ever showed signs of spirochaetosis either before or since, in spite of the presence of *Argas persicus* in the wood of the perches. If the existence of a spirochaete peculiar to the domestic duck should be confirmed the writer suggests *Spirochaeta anatis* as a suitable name for it.

Intravenous Injections of Hexamethylentetramine (Urotropine) in Human Trypanosomiasis (Dr. Pelletier).—The dose was 2 c.c. of a 30 per cent. solution; two injections were given the first day, three the second, and two the third. The condition of the patient, whose symptoms were inability to remain awake and swollen glands without fever or pain of any sort, began to improve after the first dose and rapidly became normal.

Piroplasmiasis of the Civet Cat in Senegal (A. and M. Leger).—The red corpuscles of two young civet cats (*Ficerra civetta* Pucheran) were found to contain a hamatozoon of the family Piroplasmidae, belonging apparently to the genus *Nutallia*, and for which the name of *Nutallia civetta* is proposed. It was of small size, never measuring more than 1 micron, and either rounded or oval in shape. The cytoplasm stained sky-blue by Giemsa's or Leishman's method, and showed no pigment. The nucleus was relatively large, took a deep red tint, and was situated on the periphery; it was raised above the level of the cytoplasm and extended for a distance of half and sometimes two-thirds around the circumference. In that part of the periphery

not occupied by the nucleus a grain of chromatin was occasionally seen. Two parasites were rarely found together in one cell. No division was seen and no "cross" or "square" forms. The invaded red corpuscles showed no change in form or staining reaction.

Description of Two Microfilariae found in the Blood of a Bird (Merganser serrator) inhabiting Cold Regions (R. Pons).—(1) Microfilaria legeri.—Observed in the peripheral blood of five birds out of twelve examined. No shell. Twisting and whip-like movements. Progresses by pressure on the surrounding blood corpuscles but does not adhere to them. The anterior end is rounded and shoots backward and forward; the posterior end tapers and finishes in a point resembling the button of a foil. After staining, the parasite measures from 100 microns to 105 microns in length and 5.5 microns in breadth. At the anterior end are two elongated peripheral chromatic spots separated by a space; the tail occupies the posterior sixth of the organism and terminates in a nuclear spot. The body consists of two chains of cells with large nuclei, divided by spaces (a) near the middle (centrus viscus), (b) at the root of the tail (trefoil-shaped), and (c) near the anterior fourth (triangular-shaped); the curves of the embryo apparently coincide with these spaces. (2) *Microfilaria guillemeti*.—Found in one case only. No shell. Rapid reptation movements without progression. Anterior end rounded; posterior end tapers regularly from posterior fifth and terminates in a blunt point. After staining the organism measures 250 microns to 260 microns in length and 6.5 microns in breadth. About 12 microns of the anterior end are without nuclei. The chain of cells is interrupted near the anterior third and posterior third and terminates by a chromatic spot at the posterior end.

An Attempt to Treat Microfilariasis in Carrion-eating Birds (G. Curasson).—Three specimens of *Neophron monacus*, all of whom showed numerous parasites in the blood, were treated with a 1 per cent. solution of galyol in doses of 0.5 c.c. per kilogram injected into the axillary vein. In one case after three injections (the third into the peritoneum) only dead parasites were found in the blood at autopsy; in the other two the treatment was in one instance partially and in the other doubtfully successful.

Contribution to the Study of the Biological Evolution of Porocephalus armillatus Wyman (P. Noc and G. Curasson).—A female *P. armillatus* was found under the alveolar tissue of the right lung of a *Python sebae*; in the fat of the general cavity were numerous yellowish pin-head spots which were recognized as the eggs of the parasite. Pieces of the fat were ingested by a monkey (*Cercopithecus patas*) and two guinea-pigs; no larvæ were found in either of the latter when killed two and eight months later respectively, but the patas died eighty-six days after the infective meal and hundreds of

larvæ in various stages of development were seen at autopsy. Thirty or forty of these were fed to a *Python sebae* and a sheep. The sheep was unaffected. When the python was killed 106 days later all the parasites were recovered, most of them adult, some still in process of moulting. Eggs and embryos were disseminated throughout the cellular tissue of the general cavity and the walls of the digestive tube, but none were seen in the tracheo-bronchial mucosa.

A New American Species of the Genus Phlebotomus—Phlebotomus Brumpti (F. Larrousse).—The fly was observed by Professor Brumpt in virgin forest at Albuquerque Lins, Sao Paulo. The average male measured 2.5 mm. *Antennæ*. Same general characteristics as other phlebotomi. Segment III < IV + V, the third segment extending beyond the proboscis; two short geniculate spines per segment.

Palpi.—Formula, 1 (2, 4), 3, 5.

$$\begin{array}{rcl} \text{II} & = & \text{IV} \\ \text{V} & > & \text{II} + \text{III} \\ \text{V} & > & \text{III} + \text{IV} \end{array}$$

Average relation between the length of the palpus and the epipharynx $\frac{P}{E} = 3$.

Wing.—Length 2.4 mm., equals three times greatest breadth; end blunt; posterior margin more arched than anterior. The end of the first longitudinal nervure extends only slightly beyond the first fork of the second longitudinal nervure. The anterior branch of the second longitudinal nervure is three times as long as the distance between the two forks. The fork of the fourth longitudinal is nearer the end of the wing than the posterior fork of the second longitudinal.

Genitalia resembles that of *P. papatasi*, but differs in the absence of the fringed process, the unarmed inferior elaspers and the presence of a tuft of hair on the inner side of the basal segment of the superior elaspers. The terminal segment is elongated, with parallel margins and five spines placed as follows: two at the apical end, thick, curved, less than half the length of the segment to which they are attached; two on the inner aspect and in the centre of the segment, springing from the same tubercle and similar to those of the apex; and a thinner, shorter and straight spine planted below the others on the ventral side of the segment. The inferior elaspers are unarmed, very long and very thin; they are a little longer than the basal segment of the superior elaspers. The intermediate appendages are provided with a digitiform process and the upper outer margin is hollowed out and shows fine short hairs. The submedian lamellæ are usually visible on account of the narrowness of the inferior elaspers. The female is similar to the male but slightly smaller.

Contribution to the Study of Several Forms of Mycosis in Peru (E. Escomel).—Four cases are

described. The first was that of a boy of 15, who presented multiple red, irritable, circinate areas all over the body. Microscopical examination of squame from the epidermis showed a mycelium of the genus *Penicillium*, and the condition, which had lasted for two years, was diagnosed as a mycotic *Ceara* (pinta). The second case was a chronic onychomycosis of the left big toe, which had existed for thirty-five years without affecting any of the other nails. The causal agent was a fungus belonging apparently to the genus *Tricophyton*. In the third instance the nails of both big toes were enormously developed, and turned under at both sides so as to form a kind of tube; they were so hard that a saw was necessary to cut them. Scrapings from the interior of the tubes produced a *Penicillium*. The fourth case was that of a bleeding, ulcerated, six-year-old tumour on the top of the right foot over the tarsus. The bone was not implicated. Specimens of pus and white grains from the ulcer showed a mycelium of the genus *Discomyces*.

Human Spirochaetoses at Dakar (Senegal) (F. Noc).—Under Government instructions inquiry is being made into the existence or appearance and development of spirochaetal infections in the French African port of Dakar. (1) *Yellow Fever*.—No case has been seen, and examination of the blood of children and young animals never revealed the causal agent; in a very small number of mosquitoes of the genus *Stegomyia calopus* a spirochaete resembling *Leptospira icteroides* was observed. (2) *Hell's Diseases*.—Several cases with symptoms similar to those of infective jaundice were reported, but the spirochaete was not found. The virus, however, would appear to exist in the blood of a very small number of native rats, at least from November to April. (3) *Blackwater Fever*.—The prevalence of this disease at Dakar would seem to be in direct relation to the activity of anophelid mosquitoes; nevertheless numerous spirochaetes were discovered after death in the liver of a fatal case (European). (4) *Relapsing Fever*.—In the only case seen it was improbable that the infection had been contracted in Senegal. In two species of rats parasites presenting the characteristics of the relapsing fever spirochaete were found, but it was impossible to prove that the animals had not been imported.

Canine Leishmaniasis in the Mouse (A. Laveran).—The author has studied the variations in virulence of canine leishmania after successive passages through mice, and the signs by which it is possible to recognize whether a mouse killed in good condition some months after inoculation has been infected and cured. The results of his experiments showed that the virus becomes weaker after each re-inoculation and is lost altogether after the sixteenth. When infection and cure have occurred the spleen remains larger than normal after the disappearance of the leishmania, and when the inoculation has been made into the peritoneum, the testes show a variable amount of atrophy.

The Cysticercoids of Tarentola mauritanica L. and the Tunic of the Cat (L. Parrot and Ch. Joyeux).—

The writers have proved by experiment that a cysticercoid found in *Tarentola mauritanica* represents the larval form of a *Dipylidium trinchesci*, which may or may not be peculiar to the cat. Another worm from the same experimentally infected cat was identified as *Dipylidium chyzeri*. The experiments confirm the work of Lopez Neyra and Munos Medina, and tend to explain one-half of the life-cycle of the two cestodes of the cat.

Introduction to the Systematic Study of Diptera of the Genus Phlebotomus (Carlos França and L. Parrot).—As phlebotomus, besides being known to convey pappataci fever and suspected of propagating the virus of oriental sore and verruga peruviana, is now used for experimental purposes in many laboratories, it is important that certain general rules by which the different species may be identified should be established. The writers propose the following classification: (a) Subgenus *Phlebotomus* (comprising *P. papatasi*, *P. roubaudi*, *P. duboscqui* and similar varieties). Terminal segment of the superior clasper of the male almost as long as the basal segment; intermediate appendage complex and provided with well-developed fringed and digitiform processes; inferior clasper short and armed.

(b) Subgenus *Sergentomyia* França (comprising all other species so far known). Terminal segment of the superior clasper of the male much shorter than the basal segment; intermediate appendage simple; fringed and digitiform processes absent; inferior clasper long and unarmed.

Between the two subgenera a third, for which the name *Neophlebotomus* is suggested, might be recognized; this would include species resembling *Sergentomyia* as regards the length of the terminal segment of the superior clasper and the conformation of the intermediate appendage, but with spines on the inferior clasper. *Phlebotomus malabaricus* Annandale might come into this category.

A table setting out the principal characteristics of phlebotomus, suggested formulae, numerical relations and measurements concludes the paper.

Medical News.

MARCEL BAUDOUIN (*Progrès Médical*, June 5, 1920), suggests that the diagnosis of sex in a skeleton may be arrived at through measurements of the atlas. The ratio or index between the length and width of the articular facets exhibits notable sex differences, being considerably greater in woman. The author was able to identify the male sex in certain old Gallo-Roman skeletons by the low condyloid and glenoid indexes which were respectively 42.85 and 46.15; the ratios in female skeletons of the same people would have been between 55 and 65.

THE *Veterinary Record* has been taken over by the Veterinary Association of Great Britain and Ireland. The first number of the Journal in its new form was issued on January 1.

Original Communications.

PARA-MELITENSIS INFECTION IN MAN AND ANIMALS.

By Surgeon Rear Admiral P. W. BASSETT-SMITH, R.N. (ret'd.),
C.B., C.M.G., F.R.C.P., F.R.C.S., D.T.M.&H.

IN 1912, by the courtesy of Dr. Nicolle, Tunis, I received a culture of *Micrococcus para-melitensis* which has been used for the experiments and agglutination tests. Zammit and others had described a *M. pseudo-melitensis* of which they had found examples at Malta, but Nègre and Raymond were the first to demonstrate the specific difference of the para-melitensis form from the ordinary melitensis, by a series of agglutination and absorption tests and by animal experiments.

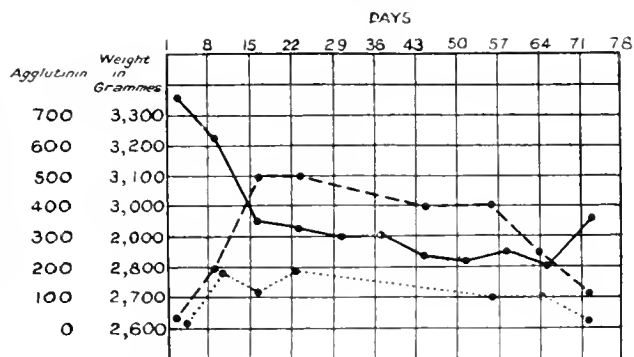
The abnormal strain at Tunis had been originally isolated by Bruce himself, and subcultures have been widely distributed to many continental laboratories. This scattering of the irregular strain has undoubtedly been the cause of many of the contradictory agglutination results that have been from time to time reported. I found that the para-melitensis strain given to me by Nicolle shows morphologically a much more definite bacillary form than that of the freshly isolated *M. melitensis*, and it is more easily agglutinated by non-specific sera, also that it is more auto-agglutinable. With it immunization of rabbits is more difficult and the agglutination curve rarely runs as high as that of the true melitensis, as shown by the diagram. The group agglutinins too were less marked with the melitensis serum for para-melitensis organisms than the para-melitensis serum for the melitensis organism in the experiment recorded; but no tests have been made of their relationship to the *B. abortus* (Bang), an organism which, according to Evans, Myer, Shaw and Feusier, is closely associated morphologically and biologically with the melitensis group. All these strains of *B. abortus*, melitensis and para-melitensis tested fell into four definite groups, abortus and melitensis being the most widely separated; the relationship of this *B. abortus* is very important with reference to diagnostic lacto reaction for prophylaxis. In the investigation at Algiers it was found that the goats brought over from Spain were frequently infected with the para-melitensis strain either alone or together with the common melitensis form. In a rabbit I immunized with the para-melitensis organism it was noted that before death the testicle became enormously swollen and this on section appeared to contain a broken-down grumous mass of material suggesting that its action is more toxic than that of the *M. melitensis*, though in man necrotic areas have not infrequently been reported. The following technique is recommended for agglutination test:—

Take sufficient serum and divide this into two parts, heat one in the water bath at 37° C. for half an hour. Use a 48-hour growth of a reliable culture to make the emulsion, with or without formalin; put up three dilutions of each serum,

1/40, 1/100, 1/400, and place in the incubator at 37° C. for two hours, then stand in the cold and read off in twenty-four hours. Always make controls with normal and specific sera at the same time. After this the extreme titre of agglutination may be found out, and absorption tests made.

PARA-MELITENSIS INFECTIONS IN MAN.

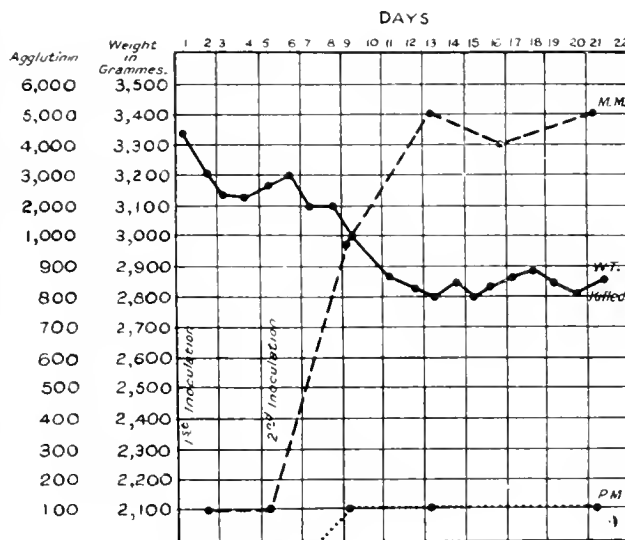
I have had four cases of this infection under observation—two males and two females. The first was a lady who contracted the disease at Hyères



EXAMPLE 1. PARA-MELITENSIS INFECTION.

— Weight curve.
-- Para melitensis agglutination curve.
..... Melitensis agglutination curve.

in the Riviera. The course of the fever was very prolonged, having very irregular intervals, and associated with great debility, anaemia, constipation, and severe neuritis and arthritis. After the disease had existed for many months I found that it was a true para-melitensis infection, and she



EXAMPLE 2. MELITENSIS INFECTION.

— Weight.
-- Melitensis agglutination curve.
..... Para-melitensis agglutination curve.

was treated with the appropriate vaccine for several months, and she made a perfect recovery from a state of great misery. The second case was that of a gentleman, aged 70, from the South of France, whom I saw through the kindness of Sir Thomas Barlow. His condition when seen was so severe that I did not recommend vaccine treatment; the patient died, and at the post mortem a secondary streptococcal infection was present with infarcts in the spleen. The third case was lately in my ward at the Dreadnought Hospital; the fever was contracted in some port in the Adriatic and he was practically convalescent when admitted, but the blood agglutinated to 1/2,000 with the para-melitensis strain and only 1/200 with the melitensis. Recovery was complete though the duration of the fever was over four months. The fourth, a fatal case, seen in consultation with Dr. Vincent Dickenson, to whom I am indebted for permission to publish the case, was that of a lady who contracted the disease at Dax, in the South of France. She had an irregular fever for months and was greatly debilitated; in this case there were present old endocardial lesions. She was treated with para-melitensis vaccine, commencing with 250 millions; five injections were given; after the fifth the temperature, which had regularly in the evening been on the 101° line, fell to 100°; but each produced a marked reaction and was followed by an intense purpura affecting the face, front of chest, arms and thighs, but leaving the back absolutely clear, later there was local necrosis at the site of injection. The vaccine when tested was sterile and when inoculated into guinea-pigs caused no ill-effects. The reaction therefore seemed to be due to idiosyncrasy, or rather a definite lowered resistance to the small extra amount of antigen introduced. Florentini states that the *M. melitensis* is able to produce a toxin which acts as a hæmolysin. Unfortunately there is no known procedure to test the toxicity, though the quantitative estimation is made of the organisms injected. I think that these organisms contain a definite endotoxin and that with the para-melitensis in particular there is an increased danger of secondary infections both in man and animals.

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A PECULIAR PYREXIA DUE TO A FLAGELLATE.

By MARCEL LEGER, M.D.

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In spite of numerous investigations we are still in ignorance of many of the serious febrile diseases existing in the tropics. For instance, Castellani and Chalmers [1] classify in what is known as the

"pseudo-kala-azar group," several chronic diseases, one of which is known in Colombia as *Tropical Splenomegaly*. The pathological symptoms are irregular fever, enormously enlarged spleen, voluminous liver, diarrhoea, rheumatoid pains and sometimes icterus; and they result in death either from intestinal hæmorrhage or consumption. The causal agent is unknown. In one case of peculiar splenomegaly in Ceylon, Castellani found bodies which he identified as toxoplasmae and for which he created the species *Toxoplasma pyrogænes*.

In 1906 Darling [2] investigated a fatal infection which had made its appearance in the Panama Canal zone. The principal symptoms—splenomegaly, intense anæmia, leucopenia and an irregular fever unaffected by quinine—resembled those of kala-azar, but autopsies on three cases showed tubercles in the organs containing a special parasite. Darling created a new class for the organism (*Histoplasma*), but it has since been recognized and denominated *Cryptococcus capsulatus*.

The clinical history of the patient whose case was described by Franchini [3] in 1913 requires more consideration. The subject, an Italian physician who died at Bologna, had lived for eighteen years in Brazil and had enjoyed excellent health during the first fifteen of them. The symptoms were—fever, intermittent at first but continuous towards the end, preceded by chills and followed by profuse perspiration; considerable emaciation; very accentuated anæmia, with leucopenia but no eosinophilia; slight hypertrophy of the spleen; enormous enlargement of the liver which, owing to the development of a cyst as large as an orange and containing a reddish liquid, increased in size until it reached the umbilicus; acute pain in the lower limbs and sacral region; a trace of albumin in the urine; and an indurated and indolent swelling in the cervical region as big as a pigeon's egg, shown by ablation to be non-purulent, and afterwards recurring in the same place. Franchini found a parasite in the blood of the patient which he described under the name of *Hæmocystozoon brasiliense*.

During a three years' residence in French Guyana the writer was able to study two cases of an unusual kind of fever for which he was unable to formulate any satisfactory diagnosis.

In the first of these the fever was of the continuous type and lasted for over six months without affecting the general health of the patient to any serious extent. That it was certainly not malaria was proved by the absence of parasites in the blood and the absolute inefficacy of quinine. The fever, which never reached a high point (generally from 37.5° to 38° C. in the morning, 38.5° to 39° C. towards midday, and again about 38° C. in the evening), was of a disconcerting regularity. The spleen was palpable but not very big. The liver was increased in size, but nothing indicated suppuration. Slight icterus. No albumin in the urine. No marked gastro-intestinal disturbance.

The second case forms the object of the present

paper. We followed it very carefully during the month before death. The clinical course of the fever did not correspond with that of any morbid entity so far described, and we found in the blood and in smears from the liver flagellates bearing no similarity to any known hæmatozoon [4].

Are fevers to which no clinical label can be applied numerous in French Guyana? The question must be answered by others, for we ourselves were not in a favourable position to collect evidence. Our patients at the Colonial Hospital were almost entirely limited to government officials, the greater part of whom were Europeans or came from the Antilles; the natives, especially those living in the forest, were attended to by the staff of the civilian hospital.

In this paper we propose to give, first of all, the clinical history and the microscopical data, and then to discuss the medical diagnosis and the diagnosis of the flagellate with which we had to deal.

I.—CLINICAL HISTORY.

The patient, T., was a Corsican, aged 48, a Custom House official. He had been in residence in Guyana since November, 1907, i.e., for 11 years, and during this long period had only once been to France on vacation, from June, 1912, to February, 1913. His duties kept him at Cayenne, the chief town in the district; in one instance only—in 1911—he had spent a few months at the outpost of Oyapock near the Brazilian frontier.

His antecedents showed neither syphilis, alcoholism nor tuberculosis. He would seem to have contracted malaria at Oyapock, but had entirely got rid of it during his visit to France in 1912.

Until the end of 1917 T. had been in excellent health; he had only once been to hospital, viz., in 1915, when he was treated during a period of four days for "fever and gastric disturbance."

In November, 1917, he was again admitted, this time with a diagnosis of "muscular pains, prostration and fever." Note was made that during the preceding few days he had had a very high temperature with anorexia, marked asthenia, gastric disturbance, symptoms of pulmonary emphysema and hæmorrhoidal pains. The temperature fell within twenty-four hours after admission, and the patient, who was of an energetic disposition, returned to his duties on the sixth day. The blood was examined on two occasions and no malarial bodies seen.

From this time onwards T. enjoyed his former good health no longer. From time to time, approximately every four or five weeks, he had a feverish attack, unheralded by any definite symptoms: the temperature sometimes rose as high as 40° C. and remained at that point for two, three or four days without any marked drop in the morning. The fever was accompanied by dull pains around the liver and hæmorrhoidal bleeding. Malarial parasites were sought for on several occasions with negative results. A regular course of quinine every two days

for several weeks was taken but did not prevent the attack we are about to describe.

After August, 1918, the feverish phases became more frequent, appearing every eight or ten days and lasting for three days or less with an evening temperature of 40° C. or more. The patient became increasingly weak. He could no longer carry out his duties and decided to return to hospital. The terminal period, therefore, evolved before our eyes.

On admission, October 8, the temperature was 39.2° C.; the two previous days it had been 39.5° and 39.8° C. respectively. The patient was very depressed. He complained of difficulty in breathing, and on examination several coarse mucous râles were noted at the base of each lung. The heart was normal. The liver was enlarged, extending beyond the costal margin; it was sensitive on deep palpation but not really painful. In the region of the gall-bladder was a fairly large dull area. The skin, and especially the sclera, were subicteric. The patient now for the first time began to vomit blood-streaked bile. The spleen was hypertrophied but not spontaneously painful or sensitive on pressure. Bright red blood was passed with the stools, about a teaspoonful each time. Hemorrhoids were present, but not to any extent. There were no gurgling sounds in the iliac fossæ.

No parasite could be found in the peripheral blood. The leucocyte count was as follows:—

Polymorphonuclear neutrophiles	..	..	46.50
Lymphocytes	..	..	50.50
Large mononuclears	...	...	3
Eosinophiles	...	...	0

On October 9, the day after admission to hospital, the vomiting ceased. The temperature fell to 37.5° C. in the morning and reached 38° C. in the evening. The pulmonary symptoms rapidly abated and disappeared altogether within the next few days.

From October 10 to 13 the temperature oscillated between 37° C. and 38° C. It then rose progressively on the two following days.

October 16 and 17, second phase of fever (39.8° and 40° C.), during which patient was in a very marked state of prostration. He began again to vomit bile containing a few streaks of blood, and signs of congestion at the base of both lungs reappeared.

From the 18th to the 21st the fever fell by lysis. There were a series of small intestinal hæmorrhages. Patient complained of intermittent pain in different joints, generally the right hip or left shoulder. There was no redness or local rise of temperature in the painful regions.

From the 22nd to the 28th the temperature was practically normal.

On October 29 a third feverish phase set in and lasted three days, with evening temperatures of 36.6° , 39.4° and 39.3° C. The heart sounds became fainter and a galloping rhythm was noticed.

The urine showed a slight degree of albumin (0.15 grm. per litre). When centrifuged micro-

scopic examination showed cells from the superficial layer of the bladder and from the urethra. No cylinders. A few intact red blood cells. No gonococci. Urea 0.25 grm. per litre. Quantity of urine rather over a litre.

Blood culture for typhoid bacilli and Widal's test gave negative results.

Under the microscope the blood showed extreme anæmia.

Hæmoglobin	...	30 per cent.
Red cells	...	1,370,000 per cm.
White cells	...	16,000 „

The leucocyte count still showed a tendency to lymphocytosis.

Search for Laveran's hæmatozoon, made nearly every day after admission to hospital, was always unsuccessful; nor were any microfilaria or spirochætes seen.

In the blood smears taken on October 29 a very few flagellates were found to which we will refer later.

The feces contained a small amount of blood but no pus. No amœbæ or other protozoa. A very few ascaris eggs were seen.

No tubercle bacilli were present in the sputum.

From November 1 to 8 the temperature remained in the neighbourhood of 38° C. Patient's general condition remained bad, and his complexion was straw-coloured. The gallop rhythm disappeared, but the heart remained weak. There was another fleeting attack of congestion at both bases. No vomiting or intestinal hæmorrhage. No œdema of the extremities. No pain in joints.

Suddenly, on November 9, towards eight o'clock in the morning, the patient was attacked by violent chills. The temperature rose gradually and rapidly to 40.7° C. at midday. It then fell, with profuse perspiration, to 37.2° C. Intense dyspnœa. Acute pain in the præcordial region. Patient collapsed and died at 1 p.m.

The treatment was purely symptomatic. Quinine given in hospital, as shown by the temperature chart, produced no more effect than before admission.

Autopsy was performed two hours after death. *Chest cavity*: Lungs absolutely healthy. Heart showed no valve lesion. Slight increase of fluid in the pericardium. *Peritoneal cavity*: No excess of fluid. Liver weighed 2.5 kg., and was normal on section. Gall-bladder much distended. Spleen weighed 400 grm., was of normal consistency, and the capsule stripped readily. No ulceration or other sign of inflammation could be seen in the intestinal tract. Kidneys macroscopically normal.

Cultures from the heart's blood and spleen pulp, made with a view to discovering the *Micrococcus melitensis*, were sterile.

Smears from the liver showed the presence of a very small number of parasitic forms with or without flagella, which will be described below. Smears from the spleen and cardiac muscle showed nothing

particular, the parasites in these organs being even fewer than those in the liver.

II.—MICROSCOPICAL DATA.

The parasitic forms were seen on examining Giemsa-stained smears from the liver pulp taken at autopsy. Having very fortunately preserved a blood-film taken on the first day of the second attack of fever with the object of finding the *Plasmodium malarie*, we discovered that it contained similar forms, though much fewer in number (exactly five). Smears from the spleen and cardiac muscle were much less productive in this direction than those from the liver.

Our curiosity was at once aroused by free organisms, from 6 to 10 microns in length, which at first sight looked like spirochætes; they were, however, thicker, showing but few undulations and no real spirals, and more nearly resembled flagella detached from trypanosomes. The flagella never adhered at one end to blocks of chromatin representing blepharoplasts, as they are often seen to do in films of the fragile *Schizotrypanum cruzi*, which is so difficult to preserve intact when spreading the blood over the slide. We may add that they were generally seen in the immediate proximity of mononuclear leucocytes.

Continuing our investigation with the utmost patience, we discovered flagella protruding from white cells of the lymphatic series, to the number of one, two or even three per individual, more often in the lymphocytes than in the large mononuclears.

We then noticed, partially or wholly enclosed within the lymphocytes, elongated bodies with blue-tinted cytoplasm, a reddish ovoid nucleus and a block of chromatin of a darker shade; in one of the bodies a long free flagellum was seen. These were undoubtedly flagellate parasites undergoing phagocytosis. In a good many instances we saw pieces of chromatin enclosed in the large mononuclears, but they were never recognizable. It is probable that absorption by large mononuclears is as frequent as by lymphocytes, though it is not so often observed as the parasite is more rapidly digested.

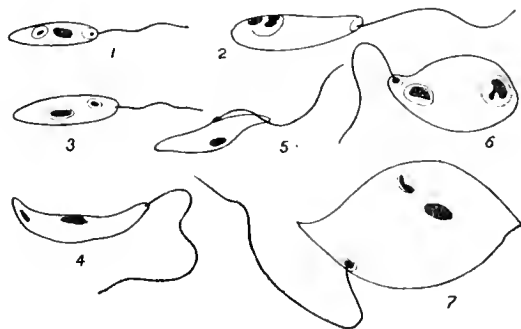
We also saw free hæmatozoa. These were of five kinds, and although we are aware that the aspect assumed by certain specimens was somewhat paradoxical, we will describe them without comment.

(1) Elongated forms with free flagella. Extremely rare. Five individuals were seen in all, two in the peripheral blood and three in the liver. In detail they were as follows:—

(a) Blue-tinted cytoplasm, denser along one edge, 3.5 microns long by 1 micron wide. The ends were rounded, the posterior end being a little sharper than the anterior; the latter was prolonged by a flagellum of the same length as the parasite. In the middle-third of the body a pink oval-shaped nucleus could be seen, and immediately behind it a piece of garnet red chromatin in the form of a rod; this blepharoplast was enclosed in a vacuole.

The free flagellum was attached not to the blepharoplast but to a grain of chromatin near the anterior end.

(b) Three elongated parasites (figs. 6, 7 and 8), respectively 4, 5 and 6 microns in length and from 1 to 1.5 microns in width. Cytoplasm not very dense. Nucleus practically in the centre. Blepharo-



plast placed behind or on one side of the nucleus, but in the latter case making a bulge as seen in specimens of *Schizotrypanum cruzi*. Free flagellum of the same length or longer than the body; in one instance only could it be traced back as far as the blepharoplast.

(c) Elongated parasite, 6 microns long by 1 micron wide, with a free flagellum of 7 microns. No chromatic body representing a nucleus could be seen; but, on the other hand, two very similar forms were present, of the same red shade as the blepharoplasts and situated at the opposite end from that to which the flagellum was attached.

(2) Rounded forms (5 to 6 microns in diameter) or oval (6 to 7 microns by 3 to 4 or 5.5 microns) with flagella less rare than the elongated forms though not frequent. We saw fourteen or fifteen of them during our microscopical examination, which covered a period of about twenty hours.

The blue-tinted cytoplasm was vacuolar and finely granular; in a very few cases one or two chromatoid masses could be distinguished.

The nuclei were ovoid or rounded, generally situated near the centre and fairly large; the chromatin was irregular in density. There were sometimes two or even three nuclei, generally enclosed in vacuoles.

The blepharoplasts varied in size and were very often situated on the periphery. We saw one, two, or even three in a single individual, though there was no relation between the number of the blepharoplasts and that of the nuclei. In one case, for instance, there were two nuclei and only one blepharoplast; in another, a single nucleus and two blepharoplasts. They were often absent altogether.

The flagella, from 6 to 8 microns in length and 1, 2 or 3 in number, generally sprang from the blepharoplasts, but all the blepharoplasts did not produce flagella (it may be supposed that they had been broken off or had not taken the stain), and

there were sometimes more flagella than blepharoplasts (which is difficult to explain).

(3) Forms similar in size and appearance to the preceding, but without flagella. They were four or five times more frequent than the above, and occasionally showed a notch on one side. In these one nucleus and one blepharoplast, one nucleus and several blepharoplasts, or multiple nuclei and no blepharoplasts might be seen. The blepharoplast was more or less large and was either in the form of a rod or oval-shaped; it was sometimes so near the nucleus that it appeared to be attached to it, while at others it was situated at the extreme edge of the cytoplasm.

(4) Special attention must be drawn to one form which was seen in the peripheral blood, was oval in shape (7.5 by 4 microns), and curved almost into a hook at one end. There were no flagella. In the faintly-stained cytoplasm eighteen little blocks of chromatin were counted, each enclosed in a tiny vacuole.

(5) Lastly, rather larger forms, from 8 to 10 microns, which we consider were parasites in process of degeneration. The contours were blurred. The cytoplasm contained large vacuoles and showed a tendency to become denser at the edge. There were four or five nuclei, or in some cases a shower of nuclei scattered all over the body.

III.—REMARKS ON THE CLINICAL HISTORY.

When T. was first admitted to hospital it was logical, in view of the prevalence of malaria in French Guyana, to attribute his condition to that disease.

The examinations we had made of his blood during the previous attacks of fever had invariably produced negative results, but it is doubtful whether they were carried out under satisfactory conditions; that is to say, whether the patient was correct in his statement that he had taken no quinine on the days immediately preceding the test. Further, T. declared that for a whole month he had taken a drastic course of quinine (1.5 grm. on three consecutive days per week), but this neither prevented a fresh outbreak of fever nor even reduced its intensity.

During the first two days in hospital Laveran's hæmatozoon was sought for with the greatest care in blood taken on several different occasions; it was never found.

The temperature, moreover, in spite of the absence of quinine from the medication, fell considerably after the first twenty-four hours.

The reason the quinine treatment was then resumed (see the temperature chart) was to make quite sure that it had no action whatever on the fever and also for its moral effect on the patient and his friends.

Later attempts to find malarial bodies were never successful.

Was the case one of typhoid or paratyphoid fever? The clinical data would scarcely permit of

such a diagnosis: the entire absence of stupor, of rose-coloured spots on the body and of gurgling sounds in the iliac fossæ, together with the long duration of the illness, all tended to contradict such a hypothesis. Nevertheless, as a confrère whom we called in to consult was inclined to think it might be an atypical ambulatory form of dothien-enteritis, a serum test and blood culture in bile were made. The results were negative.

Was it *American trypanosomiasis*? None of the cardinal symptoms of Chagas's disease—*ardema*, especially of the face, hypertrophy of the thyroid gland, encephalitis—were observed. The only factor which might justify the suggestion was the intermittent fever with long intervals between the attacks and each attack lasting several days, as seen in certain chronic forms of trypanosomiasis.

The temperature curve suggested a *spirochaetosis*, in spite of the fact that according to the clinical history more than a year had elapsed since the onset. The most careful search, however, failed to reveal *Spirochaeta norgyi*.

Was it *Franchini's*, as yet unnamed, disease? This possibility only occurred to us post mortem, on examination of the films. We gave a summary in the early part of this paper of the symptoms observed by Franchini, and it will be seen that there was but slight resemblance, if any at all, between the two cases. Franchini's patient ran a high temperature throughout the terminal period, besides showing an intrahepatic cyst of doubtful nature and a recurrent swelling of the cervical region. Moreover, he had neither the fleeting and very curious attacks of congestion at the base of both lungs during the feverish phases nor the frequent intestinal hæmorrhages which were characteristic of our own case.

Undulant fever had also to be considered. The *Micrococcus melitensis* has never been observed in Guyana, but it exists in Venezuela and might have been imported. Our patient, moreover, was a native of Corsica; Malta fever is endemic in that island, as we have ourselves shown [5], and he had on several occasions eaten goats' milk cheese sent from home. The germ, of course, is known to live for several weeks in such cheese.

Clinically the diagnosis of undulant fever seemed most applicable—the length of the illness, the recurrent attacks of fever (which, although somewhat abrupt, might be considered as undulations), the sudden and temporary congestion of the lungs, and the vague rheumatoid pains in the joints without local rise of temperature or redness. We were about to attempt to confirm this hypothesis by blood culture when, at the beginning of the third paroxysm of fever, death intervened, tragic in its suddenness.

In pursuance of our idea we performed an autopsy immediately after death. Splenic pulp and pieces of liver into tubes of broth, but no *M. melitensis* was grown.

Smeears from the organs, and in particular from the liver, showed the curious flagellate we have

described. Had we had the slightest expectation of finding a hæmatozoon we should certainly have taken a much larger number of smears from the organs as well as specimens of the bone marrow; we might then, perhaps, have been able to demonstrate the life-cycle of the parasite. As it was, our evidence was incomplete.

If, as we think and will explain further on, this parasite has never yet been described, we shall be in the presence of a new morbid entity. The case might possibly be one of Colombian tropical splenomegaly, the ætiology of which is unknown. The intestinal hæmorrhages, rheumatoid pains, irregular fever and icterus would appear to be common to both.

At what period did the patient become infected? In 1911, i.e., nearly six years before the appearance of the earliest symptoms, T. spent some time in the district of Oyapock, a part of French Guyana near the Brazilian frontier. There he lived the bush life, under unfavourable conditions as regards hygiene, and contracted a fever which was presumed—quite logically—to be malaria. Living in close contact with the natives, and in particular with those returning from the interior, he was exposed to the bites of many different insects. From that time onward T. had never left Cayenne, except on the rare occasions when his duties obliged him to make brief visits to the country districts outside the town.

IV.—CLASSIFICATION OF THE PARASITE.

Though unable to establish an uninterrupted sequence in the parasitic forms described, we may go so far as to state that we have encountered a flagellate hæmatozoon which passes through a stage of existence somewhat resembling the *Trypanosoma* stage and whose life-history does not usually evolve in the human organism. The blepharoplast is at first situated posterior to the nucleus, then on a level with it, and finally appears well on in the anterior third, thus resembling the genus *Leptomonas* after passing through a crithidial stage. Multiplication then appears to take place by schizogony. The parasite becomes rounder. The nucleus and the blepharoplast multiply. In the initial stages flagella may be seen—we have noted as many as three.

Several points remain obscure. How can the fact be explained that in the trypanosoma or leptomonas forms the flagella do not continue until they reach the blepharoplasts or at least their immediate proximity? Is it due to insufficient staining? Similar appearances may be seen in cultures of some of the flagellates of insects or of *Leishmania donovani*. What is the reason of the disparity in the number of nuclei and blepharoplasts in the multiplication forms, both being sometimes altogether absent? This disparity is shown, though only in a very few instances, in the illustrations to Minchin and Thomson's work [6] on the evolution of *Trypanosoma Lewisii* in the stomach of the flea. On the other hand, we have observed that the

nucleus and blepharoplast of *Schizotrypanum cruzi* are in certain cases very difficult to differentiate one from the other, being of the same size and having an almost identical staining reaction.

The parasite seen by us in French Guyana certainly belongs to the family *Trypanosomidae*, and the possibility of its being *Schizotrypanum cruzi* occurs to the mind.

The *Schizotrypanum cruzi*, however, does not show schizogony in the peripheral circulation; its evolution goes no farther than intramuscular Leishmania-like forms such as we were unable to discover in the sinears from the cardiac muscle of our subject. Moreover, the flagellate form of the Guyana parasite differed in size from Chagas's hæmatozoon and also as regards the enormous blepharoplast which is characteristic of the latter.

Our parasite showed some resemblance to that described by Franchini under the name of *Hæmocystozoon brasiliense*, and which Brumpt [7] classified as a special species of *Herpetomonas*, the *H. brasiliensis*.

Franchini placed the types found in five groups:—

(1) Small parasites, usually lance-shaped, from 3 to 6 microns by from 1 to 2.5 microns, with nucleus, but no centrosome or flagellum.

(2) Elongated parasites, also without flagella, larger than the above (from 12 to 16 microns by 3 microns) showing, besides the nucleus, a rod-shaped centrosome situated at a variable distance from the nucleus; the centrosome and nucleus stain violet red, the former a rather deeper shade.

(3) Forms not unlike the preceding, but with flagella, sometimes very long (20 microns). The centrosome may be absent. Some show black pigmentation in the cytoplasm.

(4) Forms without flagella, of variable size and appearance, containing masses of chromatin (2, 3 or even more), some of which may, according to the author, be regarded as voluminous centrosomes.

(5) Encysted parasites, fairly polymorphous.

It is therefore a parasite dwelling in the blood, showing in man the morphological characteristics and even the encystment observed in the intestinal flagellata of insects. This fact, says Brumpt, upsets all accepted ideas as to the adaptation of flagellata to the conditions of existence in the blood.

If the parasite found in Guyana recalls the *Hæmocystozoon brasiliense* of Franchini, it differs from it radically in two respects, viz., in the complete absence of pigment, and the complete absence of cysts.

There remains the comparison with the trypanosomes. Our parasite differs from the pathogenic trypanosomes of man and other mammals (which divide by binary fission only) in the whole series of evolutionary forms we have described. On the other hand, it slightly resembles the trypanosomes of the type *Lewisi*, which may show multiple divisional forms though of much smaller size.

The flagellate observed in French Guyana is therefore somewhat related to the genus *Trypanosoma*. We are not inclined, however, to consider

it a true trypanosome and, at least temporarily, we suggest for it the name *Trypanopsis maligna*.

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BRONCHIAL SPIROCHÆTOSIS.

(CASTELLANI'S BRONCHITIS.)

By RALPH W. MENDELSON, M.D.

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THIS cosmopolitan disease, first described by Castellani in 1905, was observed in Siam when, as a consulting surgeon, I had occasion to examine a soldier applying for a medical discharge, complaining of tuberculosis of the lungs. This was in the latter part of 1916. In May of 1919 I mentioned the disease in a paper published in the *Journal of the American Medical Association*. Since that time I have seen so many cases in Siam that they no longer appeal to one as being out of the ordinary. The Central Hospital of the Local Sanitary Department treats thousands of patients every year in the free clinic of its out-patient department, and it is estimated that at least 5 per cent. of all patients submitting sputums for examination prove to harbour a spirochætal infection.

ÆTIOLOGY.

Nothing new can be said regarding the cause of the disease. The parasite shows the same variations in size as has been observed by others. It is comparatively easy to demonstrate; I have had no trouble in staining with the ordinary stains. Its one characteristic is its pleomorphism. Branching forms have been seen, also some with many waves, and yet again some that appear almost straight. It has been observed in pure culture and in combination with many other organisms. The following drawings made from slides are typical. In a previous communication mention was made of a form of broncho-pulmonary spirochætosis in cats, many of the animals having died of a suspected pneumonic plague, but upon a post-mortem examination it was found that they had all died from a pneumonic spirochætosis.

SYMPTOMATOLOGY.

Regarding the types of the disease I have not seen any acute case. The cases as observed here

could all be classified as subacute or chronic, the great majority being chronic. Many cases are observed as complicating malaria, dysentery, and the various tropical fevers of the country. The history of a very interesting case follows:—

Female patient, aged 15. Previous history negative except for several attacks of diarrhoea. Denied any other illness past or present. Patient had been

colonic area and very tender over left tubal area, scaphoid end not rigid. Liver and spleen normal. Circulatory system organically normal. Patient very nervous. Complained of slight pain while at stool, but not a great deal. Stools numbered 8 to 10 in twenty-four hours, contained blood and mucus, and laboratory examination confirmed bedside diagnosis of amoebic dysentery. Taken to hospital. Ran a typical septic temperature for three weeks. Blood examination showed whites 25,000 and chronic subtertian malaria. Patient constantly expectorating large amount of thin frothy material, but no blood macro- or microscopically. Lungs normal except for few fine râles, at first thought to be hypostatic in origin. Examination of sputum negative for tubercle bacilli, but containing hundreds of spirochaetes to the field. Active treatment maintained all of the time, but patient gradually declined until at end of three weeks circulatory system gave out and patient died.

The physical findings in a case of chronic bronchopulmonary spirochaetosis do not differ from any other chronic pulmonary infection, and from the physical examination alone one cannot diagnose the disease. No doubt many so-called "cured consumptives" have been chronic spirochatal infections greatly improved or actually cured as a result of tonic mixtures containing arsenic.

The sputum in most of the cases observed is somewhat characteristic in that it is usually white and frothy and watery. Where the infection is a mixed one the sputum then has a greater tendency to become muco-purulent and to contain blood, this feature is quite constant.

The temperature is not characteristic, and in some severe cases complicating chronic malarial the temperature remained quite normal during the malarial paroxysmal intervals.

The blood examination is not characteristic, although a definite statement cannot be made until many uncomplicated cases have been examined.

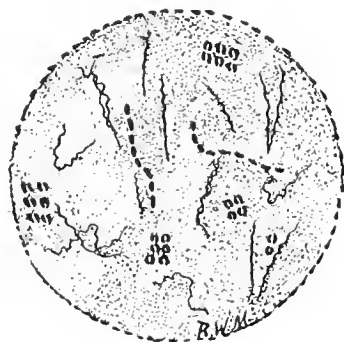
The effect on the patient is the same as would be observed in one suffering from a chronic tuberculosis. Some cases show extreme wasting and emaciation, while others simulate a chronic fibrous tuberculous infection with a slow but gradual decline.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS.

A positive diagnosis is made in the laboratory. Many different diseases might be mentioned in connection with the differential diagnosis, but the infection par excellence to be kept in mind is tuberculosis.

TREATMENT.

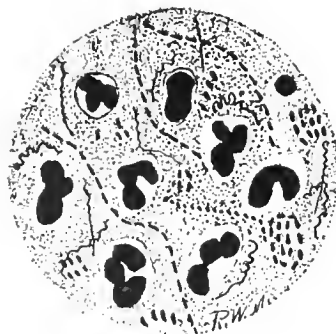
Arsenic is specific, and I use it in the form of liquor arsenicalis, as recommended by Castellani. Other treatment is purely symptomatic. The results in most cases are very good, complete disappearance of all signs and symptoms attending the administration of but comparatively small amounts of the medicament.



Muculent Sputum.



Watery Sputum.



Muco-purulent Sputum.

ill ten days when called in consultation. Temperature 104° F. in p.m. and 100 in a.m., practically same from onset, which had been sudden and without chill. Physical examination revealed the patient to be fairly well nourished. Thorax, a few fine râles in back both sides. Abdomen tender over

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MARCH 1, 1921.

MEDICAL EDUCATION IN CHINA.

A LARGE meeting was held at the Royal Society of Medicine on Monday, February 21, 1921, at which a paper was read by Mr. Harold Balme, F.R.C.S., giving an excellent account of the several institutions, most of them styled colleges, devoted

to the teaching of Western medicine which had sprung up in China during the past fifty years. It was a vigorous and well-set-out story, giving as clear and comprehensive an account as possible of the more important attempts to form centres of medical education in China chiefly by the American and British peoples. Sir Donald MacAlister, K.C.B., F.R.S., Principal and Vice-Chancellor of the University of Glasgow, occupied the chair, and in a short introductory speech expressed his interest in all Christian propaganda in China, and especially in medical missions. After hearing Mr. Balme's paper read, Sir Alfred Pearce Gould, K.C.V.O., proposed: "That, having heard with pleasure of the sympathetic interest of the Chinese Government in the development of modern medicine in China, and of the steps which have already been taken by British and American medical practitioners to co-operate with the Chinese in the establishment of medical schools in which the highest standards are set, this (London) meeting of members of the British medical profession desires to place on record an expression of its sympathy with this effort, and its willingness to promote in every way possible the advance of medical education in China." This resolution was seconded by Mr. McAdam Eccles, F.R.C.S., and unanimously carried.

The Hong-Kong University was represented on the platform by Dr. H. G. Earle, Dean of the Faculty, and Professor of Physiology in that University, and by Sir James Cantlie, the founder of the "College of Medicine for Chinese" now merged in the medical faculty of the University. Professor Earle pointed out that (after the University had been built and largely endowed by the British community in Hong-Kong) the Chinese had most beneficently endowed several of the important chairs in the University and co-operated both financially and in supporting the prestige of the Hong-Kong University as a centre of medical education for the south of China more particularly.

Dr. Louis Sambon extolled the ancient art and science of medicine in China, and from there as well as from India the Greeks derived most of their knowledge that has caused them to be looked upon as the pioneers of medicine in Europe.

A vote of thanks was proposed to the Chairman by Mrs. Scharlieb; and Sir John Jordan, K.C.B., late British Minister, in seconding the resolution, said that the British had initiated systematic teaching of medicine in China, but that the Americans had recently largely supplanted them in the extent of their financial support, and had sent a larger number of teachers to fill the posts in the medical schools.

It is well that this question of medical education in China should be thus brought before foreign countries. No one can say when or by whom Western medicine was introduced into China. The Portuguese and the Dutch, although they were in occupation of parts of China over three centuries ago, did little; for in both their parent countries in Europe medical knowledge was mostly empirical

and they had little to impart to the Chinese on the subject. The first real introduction of a "healing art" was made by the East India Company in 1801, when vaccine was brought to Canton and there used as a protection against small-pox. The Chinese had, of course, used the matter from dried small-pox scabs long before then, but bovine vaccine was with scientific precision used only after 1801. The good effect was soon undone, for after a time the continuance of the use of this initial vaccine in the course of years lost its power, although they went on transferring it from arm to arm until the good effects became exhausted. It was not until 1891, when the writer persuaded the then Governor of Hong-Kong (Sir Wm. Des Vaux) to grant permission to erect a vaccine institute in Hong-Kong, that fresh vaccine could be supplied on a wide scale in the Far East.

Medical knowledge to the Chinese was for a considerable time given by every British medical man in China, inasmuch as they always had one, two or three "students" attached to their practice who, trained by their master, acquired a certain amount of clinical knowledge and the rudiments of anatomy and physiology, minor surgery, &c., and they at times became extraordinarily well skilled in several branches of surgery, acting as assistants at operations and as dressers and even as clinical clerks.

Sir Patrick Manson in Formosa and Amoy, Dr. Kerr at Canton, and several others gave instruction to classes of learners, but it was not until Dr. Kenneth MacKenzie, of the London Missionary Society, in Tientsin, in 1881 unfolded his scheme for more systematic instruction to the great Viceroy, Li Hung-Chang, that a medical college was actually established. It was again the London Missionary Society that the writer approached when he drew up his scheme for the establishment of a medical college in Hong-Kong in 1887; the Society welcomed and supported the idea warmly, and gave the use of their premises, the Alice Memorial Hospital in Hong-Kong, in which to hold classes and teach their students. Hong-Kong was favourably situated for the purpose, for here resided a number of local practitioners, of medical men of the Civil Government, of the Army and of the Navy, in all some forty British qualified medical men, willing to take up the work of teachers and examiners. The Government botanist, Mr. C. Ford, and his assistant superintended the teaching of botany; the Government chemist taught chemistry; Dr. Ho-Kai (after Sir Kai Ho-Kai), a student in medicine at St. Thomas's, London, a graduate of Aberdeen and a barrister-at-law, taught forensic medicine and larger subjects. This was in 1887. Dr. Patrick Manson taught medicine; Dr. Wm. Hartigan, gynaecology; Dr. Paul Jordan, pathology; and Mr. James Cantlie, anatomy and surgery. Soon Dr. J. G. Thomson, of the London Missionary Society, joined the staff of teachers, and chiefly through his enthusiasm and capability as a teacher, demonstrator, tutor, and his wisdom as an administrator, was the routine and high standard of discipline of the

College maintained and advanced. As the pioneers (during the long period of twenty years whilst the College was maintained) necessarily dropped off other willing teachers came forward, and through their example and good work at last the British residents, especially J. D. Scott, Esq., and H. Moly, Esq., came forward, and by their public spirit founded and built the University of Hong-Kong. Although a secular college, the Hong-Kong University owes its establishment to the welcome and accommodation given to the original College of Medicine in the buildings of the London Missionary Society. Recently, and chiefly through the munificence of the Americans, especially through the Rockefeller Fund, a great university has been begun, equipped and founded in the North of China, at Tsinan, in the Shantung Province.

In the case of Shantung the matter is quite opposite to that of Hong-Kong in its beginnings. In Hong-Kong the teachers of the College worked well-nigh twenty years without remuneration of any sort. When the University was founded the funds were raised locally from British, Indian and Chinese merchants, with some help from the local government. In Shantung that great benevolent fund—the Rockefelle—came to the assistance of Shantung, and found thereby a sum sufficient to endow and provide for (to a great extent) a large staff in the neighbourhood of some two dozen. Locally amongst the missionary population but few could be spared from their local Christian teaching in far apart churches, meeting houses, &c., so that if missionaries were apportioned to permanent work in the University others would have to be sent out to supply their places throughout the length and breadth of the country. All the more credit to the American philanthropists who contribute to the Shantung University, for if the missionaries are not so used, then still more are they to be admired for importing at so great an expense fresh teachers from abroad.

To the world outside China the development of the Shantung University was like bringing a foreign plant to a strange shore, an attempt to develop a new doctrine in unprepared surroundings. Yet it has been accomplished with success and the infant creation is already a prodigy. China has assimilated science as she has from time immemorial assimilated and incorporated within her ample proportions many peoples and many tribes. That it will thrive is undoubted, and the energy, the money and diligence of its promotion by Britain and America have been successfully planted and will bear "sweet and refreshing fruit."

In the Shantung University at Tsinan a further new development has taken place, and is none other than that the Chinese language has been adopted as the medium by which scientific medicine is to be taught. At once it is suggested that China has no scientific terms in its terminology, and that the language of the West must be incorporated with the ancient language of a purely commercial and agricultural people. Was it different in Europe? Rome

adopted and incorporated the scientific language of the Greeks, and the Greek and Roman languages were adopted as the basis of the nomenclature of science in all countries of Europe and America. The anatomical, physiological, clinical and pathological terms now in use in Northern and Western Europe were foreign to these countries, but they have become incorporated and adopted as the medium of communication everywhere. In China in the course of time the same thing will happen. The Japanese have done so without difficulty, and in China the mental powers of the Chinaman, with his superlative brain—the largest of any race—will surmount the apparent difficulty with ease. In Hong-Kong, the southern university, the teaching is in English; in Shantung, the northern university, the teaching is in Chinese. To which will the Chinese drift for their education? It would naturally seem as though the flow would go northwards, but the languages in the north and south are different. It is Mandarin in the north and Cantonese in the south, and the two are as different as English from French, so that the student from the South of China, were he to go north, would have to learn what for him is a foreign language, just as much as English is a foreign language to the Cantonese. It is a question which he will take to. A factor in favour of the southerner going north is that the written language of both is the same; it is but the spoken languages that are different. The Cantonese are the commercial race of China, and English opens the door not only to the whole of the markets of the world, but also allows of a world free channel of inter-communication in science with the English-speaking races, an enormous beneficial factor not only to the Chinese but also to the rest of the world. For that the Chinese by their ability will play an important and useful part in medicine and other sciences is undoubted; thereby advancing the world's knowledge by adding to its armamentarium a people capable of illimitable development in whatever work they may devote their talents to.

Annotations.

Leper Colonies and Improved Treatment in the Control of the Disease (Lt.-Col. Sir Leonard Rogers, M.D., *International Journal of Public Health*, vol. i, No. 3, November, 1920).—The author is of opinion that the value of segregation when thoroughly and efficiently used, together with improvement in the treatment of the disease, have placed in our hands the power to deal with this terrible disease which we have hitherto lacked, and now is the time to take vigorous action on carefully thought out lines to rid all countries of the plague of leprosy.

Divisions of the So-called Flexner Group of Dysentery Bacilli (Wilburt C. Davison, M.D., *Journal of Experimental Medicine*, vol. xxxii,

No. 6, December, 1920).—By the Flexner group, the author refers to Gram-negative, non-motile bacilli, isolated from the stools of cases of clinical dysentery and agglutinated by the patient's serum. They produce a small amount of indol, do not liquefy gelatin, fail to ferment lactose, and produce acid and no gas in dextrose and mannitol. These are the only constant cultural characteristics. It would seem advisable to apply one name, *Bacillus dysenteriae* Flexner, to this whole group. These mannitol-fermenting dysentery bacilli have been subdivided in two ways, first by fermentation tests with maltose, saccharose, dulcitol and rhamnose, and secondly by agglutination tests with the sera of immunized rabbits.

The author considers that the divisions do not appear to be sufficiently distinct to warrant the use of separate names. To avoid confusion all mannitol-fermenting dysentery bacilli should be called *B. dysenteriae* Flexner, and the subdivision noted. There are two methods for this division, one by the fermentation of carbohydrates, the other by agglutination with monovalent rabbit sera. These do not coincide, and one or the other and not both must be adopted. Inasmuch as Murray studied organisms from widely distributed sources, it would seem preferable to adopt his serological classification and to add to it the types that fail to be agglutinated by his V, W, X, Y and Z sera, as this method is simpler and more rapid. The results of the agglutination reactions of the patient's serum may be expressed in the same terms as the serological typing of the organism from his stool. Fermentation is less constant and gives rise to more divisions than there are carbohydrates.

The serological reactions of these type sera, as Murray points out, shows cross-agglutination to a greater or less extent, but they indicate that there are five antigens, V, W, X, Y and Z, and probably others, one or more of which predominate in a given strain. Polyvalent diagnostic and therapeutic sera are practically worthless unless they include antibodies for the more common of these types.

The diagnostic importance of recognizing that there are five or more antigens in this group is seen from the fact that the sera of some patients react with one, others with another, and that, unless several antigens are used, some positive tests may be missed.

Use of Chenopodium in Treatment of Amoebic Dysentery (W. Rose, *International Health Board, Sixth Annual Report*, 1920).—Several observers have used oil of chenopodium in the treatment of dysentery. It is reported to remove encysted amoeba, to cause the disappearance of blood and mucus from the faeces, and to give prompt relief to the patient. In Siam the treatment used is as follows: 37 mls (1½ oz.) of magnesium sulphate are at first given. Two hours later 1 ml of oil of chenopodium follows. One hour later a similar dose of the oil is administered, followed in another hour by 37 mls of castor oil. For more severe

cases, either the preliminary purgative is omitted and 2 mls of chenopodium in 37 mls of castor oil are given in a single dose, or 1 ml of oil of chenopodium, emulsified with gum acacia, is administered by way of the rectum. In the latter mode of treatment the anal mucosa is protected by petroleum, and the injections are terminated with 50 mls (2 oz.) of an inert oil. The buttocks are elevated, and the enema—the first dose of which does not exceed 200 mls (8 oz.) for an adult—is given slowly.

Abstracts.

BRONCHO-PULMONARY SPIROCHÆTOSIS (CASTELLANI).¹

By MOISE D. LEVY, M.D.

THE attention of the profession was recently directed to the numerous cases of Castellani's bronchitis being reported from various parts of the world, and to the probability of like infections occurring in this country. That this was most probable was suggested as a result of the close association of the American troops in France, Germany and Italy, with groups from areas which were known to have been infected with the spirochæte.

Castellani's first descriptions of this disease appeared in 1905 and 1906, when he reported two cases observed by him in Ceylon, in the sputum of which he observed spirochætes in large numbers, differing from the spirochætes usually seen in the mouth. His observations were quickly confirmed by Branch in the West Indies, who reported a case showing a mixed infection, pulmonary tuberculosis being found at necropsy, while during life large numbers of spirochætes only were present in the sputum.

In Castellani's original article he divided the spirochæte morphologically into four groups, as follows: first, spirochætes 15 to 30 microns in length, with irregular waves, which varied in number but were never numerous, the spirochætes being pointed at both ends; second, spirochætes resembling the *Spirochæta refringens* (Schaudinn), with few graceful curves and pointed extremities; third, spirochætes that were thin, delicate, with numerous small, rather uniform waves and tapering ends; fourth, very delicate spirochætes, thicker than the *S. pallida*, with few waves, generally irregular in shape.

Fantham states that the organism presents marked pleomorphism, varying in length from 5 to 27 microns, and in breadth about $\frac{2}{10}$ to $\frac{4}{10}$ micron. These variations he considers "are due to processes of growth and division. The shorter forms,

those from 7 to 9 microns, result from the transverse division of the longer forms. The ends of the spirochæte show much variation in form, but approach the acuminate type on the whole. In the fresh specimen the movements of the *S. bronchialis* are very active but of short duration, the motile phase being succeeded by one of granule formation, the granules or coccoid forms serving as a resting stage from which new spirochætes are produced." It is also believed that the granules are probably the infective agent and spread the infection from man to man by the air.

Since the appearance of the first reports of bronchial spirochætosis numbers of articles and reports have appeared from all over the world. Doubts were early expressed as to the new organism really being anything more than the usual mouth spirochætes, which had been aspirated into the bronchii. Macfie, after a careful study of the spirochætes in the mouths of the natives of West Africa, found some spirochætes indistinguishable from those in the bronchial mucus. He considers it very probable that the cases he observed may have been due to the invasion of the bronchii by spirochætes normally present in the mouth. Chalmers and O'Farrell in Khartoum studied this organism carefully, carrying out successfully several inoculation experiments in monkeys. Their conclusions were that the "*Spirochaundinnia bronchialis* (Castellani, 1907) is a good species, and that the different forms may probably be closely related to one another as different phases of growth and division of one and the same spirochæte, rather than different species of spirochætes." Fantham, who was engaged in a study of spirochætes at this time in Chalmers's laboratory, published his observations in 1915, stating that "*Spirochæta bronchialis* is a species distinct from the spirochætes occurring in the mouth. It differs from them in morphology, pathogenicity, and in staining reactions. It is not a developmental form of any bacterium, and is an entity in itself." The investigations of these two men, corroborating Castellani's original statements, has resulted in the *Spirochæta bronchialis* (Castellani) being accepted, as Fantham states, "as an entity in itself."

TYPES OF DISEASE.

Castellani has described three types of the disease caused by the spirochæte, viz., the acute, subacute, and chronic types. In the acute type there is usually a chilly sensation and fever, which, however, rarely exceeds 103° F. The fever may last from two to eight days. Coughing is pronounced, expectoration scanty and muco-purulent, and rarely contained traces of blood. Rheumatoid pains all over the body may be complained of, otherwise in most cases the general condition of the patient is not much affected.

The attack in subacute broncho-spirochætosis begins suddenly or gradually, and lasts from two to several weeks, many cases showing little or no fever, and no change in the general condition.

¹ Abstracted from *New York Med. Journ.*, vol. cxiii, No. 5, January, 1921.

The cough is frequent and a pink jelly-like mucus is expectorated, although a true hæmoptysis may take place. The physical signs of a simple bronchitis are usually present, though occasionally small patches of dullness may be associated with the crepitations. A slight anæmia may be present in the blood, but the total and differential count of white blood cells is normal.

Chronic broncho-spirochætosis may follow an acute or subacute attack, or more frequently may have a slow insidious onset. The symptoms and signs are those usually of a chronic bronchitis, but for periods of two or three days or longer the sputum may contain blood. Frank hæmoptysis is not uncommon, a few drams to an ounce or more of blood being expectorated. These cases may also exhibit an irregular fever with either a morning or an evening rise, and other findings of phthisis may be elicited, such as consolidation with râles on the chest, and emaciation. A slight degree of anæmia is all that is noticeable in the blood. The course of the disease may be prolonged, and is essentially chronic. There may be periods of great improvement with apparent cures, varying with relapses of a severe nature, during which hæmoptysis may be a prominent feature. As concerns life, the prognosis is considered favourable.

As far as we have been able to ascertain, reports mentioning the presence of pulmonary spirochætes have appeared only twice in cases from the United States. Rothwell, in 1910, reported a few cases observed by him in and around Kansas City, and later Peters, of Cincinnati, reported the presence of Castellani's *Spirochæta bronchialis* in some cases of fœtid bronchitis and pneumonia, coming to autopsy.

During the past three years it has been our good fortune to have observed two cases, which we believe are due to the *Spirochæta bronchialis* (Castellani).

DIAGNOSIS.

The diagnosis of this condition rests on the microscopic examination of the sputum, collected after having the patient rinse his mouth well with sterile water or some antiseptic. It will be noted that we used hydrogen peroxide and potassium permanganate solution (1-1,000) as a mouth wash. This we thought necessary, as the patients were suffering from a pyorrhœa from which spirochætes might have entered the sputum. Observing these precautions and being certain that the specimen collected is really coughed up from the bronchial tubes, and finding the organisms in the stained smears in large numbers, are, in our opinion, *prima facie* evidence that the patient has broncho-spirochætosis. Smears are made as usual and are stained with any of the ordinary aniline stains. We have found Wright's stain as used for blood smears, or a dilute solution of carbol fuchsin the most satisfactory stain. In positive cases the spirochætes are seen to be present in large numbers and other organisms are surprisingly scarce. After the acute symptoms have

subsided, and when the patient appears to have recovered, a careful search of smears of the sputum is usually rewarded by the finding of a few spirochætes.

The similarity of the symptoms and signs of broncho-spirochætosis to malaria, influenza, and pulmonary tuberculosis, makes it imperative that a careful study of each patient be made before arriving at a diagnosis. Malaria may easily be eliminated by the absence of plasmodia from the blood smears, and influenza may be ruled out by a sputum examination and failure to find the Pfeiffer bacillus (if we are to consider this organism as the causative agent of influenza).

DIFFERENTIAL DIAGNOSIS.

It is the acute forms of bronchial spirochætosis which may be confused with the diseases mentioned. The chronic form is differentiated with more difficulty from pulmonary tuberculosis as the symptoms and physical signs of these two conditions may be identical. It has also been demonstrated that these conditions may co-exist in the same patient, thereby increasing our difficulty. The absence of the tubercle bacilli from stained smears after careful examination and concentration of the sputum, with many spirochætes being present, suggests strongly the diagnosis of spirochætosis. Inoculation of a guinea-pig with the suspected sputum should be done, when in the absence of tuberculous changes in the guinea-pig we may conclusively state that tuberculosis is not present. The value of the X-ray in this condition is doubtful. Our second patient presented negative findings during the time when he was exhibiting definite pulmonary signs, while a report of active tubercles in the lungs was returned some months later when the patient was presenting no symptoms and a careful physical examination of the chest by two observers could elicit nothing definitely abnormal. Barker has stated, as have others, that when X-ray findings of the lungs in suspected tuberculosis do not agree with the symptoms and signs and a careful physical examination, it is better to discount the X-ray report. This we were inclined to do with our case.

In tropical countries bronchial spirochætosis must also be differentiated from endemic hæmoptysis, this being comparatively simple, because of the absence of the ova of *Paragonimus westermanii* from the sputum. Bronchomycosis, which may occur in any climate, is eliminated by the absence of fungi from examinations of fresh sputum.

TREATMENT.

The symptoms in acute cases usually disappear after a few days' rest in bed. For the rheumatoid pains, salicylates or codeine may be necessary. If hæmorrhage is a prominent feature, the usual remedies as employed in other pulmonary disorders are advised, such as morphine, ice-bag to the chest, calcium lactate, or, in severe cases, blood transfusions. The anæmia is combated by the usual tonic remedies, of which iron in some form is the

basis. In the way of specific treatment arsenic has given better results than any other drug used. Recently much success has attended the intravenous use of one of the arsphenamine products.

THE CONVERSION OF AIR INTO A LETHAL MIXTURE OF GASES BY STORAGE OF TOBACCO AND OTHER VEGETABLE SUBSTANCES.¹

By R. C. FREDERICK.

In analysing some samples of air which had been sent for examination, the writer was struck by the presence of an altogether abnormal quantity of carbon dioxide associated with a very much diminished oxygen content. In view of this excess, the space from which these samples had been obtained was then thoroughly ventilated, and after remaining closed for only four days, the air was found to contain already 2.27 per cent. of carbon dioxide instead of the normal 0.03 per cent. No immediate explanation of the phenomenon was available, and this paper contains a short account of the research made to discover the cause.

The space was an uninhabited and unventilated store-room. Examination showed that the carbon dioxide could not have gained access from an external source, and that it must have been derived from the contents of the store.

Amongst the stores was a considerable amount of tobacco which was found to be very mouldy. Part was in the form of the whole loose leaf, and the remainder was the prepared tobacco mixture contained in cardboard "war-time" receptacles, which could not be as hermetically perfect as the tins which they were temporarily replacing.

Experiments were made under conditions imitating those prevailing in the store-room to ascertain if, and under what circumstances, tobacco could effect any marked alteration in the composition of the air in which it was stored. For this purpose air sample bottles of 60-70 c.c. capacity were used.

They were thoroughly flushed out with pure air, and known quantities of tobacco of varied quality were placed in them. The vaselined stoppers were secured with rubber bands; the subsequent examination showed the necessity for this precaution as a very strong pressure was generated. These bottles were allowed to remain sealed for a period of eighteen days (and longer) at temperatures of 12° C. and 37° C., at the end of which time they were opened under mercury and the residual air in them was analysed. The analytical apparatus employed was a Haldane for general air analysis, together with the accessories already described for use with the Haldane apparatus for estimation of carbon dioxide only (*J.S.C.I.*, January 31, 1916).

In consequence of the first findings the research

was extended to include the action of hay and potatoes.

These experiments show that under certain conditions, and after elapse of sufficient time, tobacco stored in an unventilated space converts the air into a mixture of gases entirely incapable of supporting human life, and therefore that anyone entering such a space after these conditions had prevailed would be almost instantly killed.

An essential condition for this reaction is that the tobacco be damp; air-dried tobacco containing less than 10 per cent. of moisture is not productive of danger even after three days. It is to be noted that tobacco in this latter state gives an apparent physical indication of much less than 10 per cent. moisture content.

The degree of conversion is proportionate to time up to a maximum. The presence of mould and micro-organisms accelerates and increases the reaction, but it is not the causative agent. The reaction is effected by the tobacco itself, and is not due to any material which may be added in the course of manufacture.

The decomposition is increased by heat; neither carbon monoxide nor any other combustible gas is produced by the reaction.

The same conversion occurs when hay or potatoes are stored in an unventilated space, and probably also in the presence of a large number of other vegetable products.

The research has a practical application in showing the necessity for storing damp vegetable products only in spaces where efficient ventilation is assured.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.
November 10, 1920.

The Pasteur Institute at Saigon: Its Present Situation and the Conditions under which it Works (Noel Bernard).—The first French colonial laboratory was established at Saigon in 1891-1893 for military purposes, and was taken over as a branch of the Pasteur Institute in 1904. Though aided financially by the French Government, technically and administratively it was independent, and contributed to its own support by the sale of vaccines, &c. In 1918, finding itself hampered in every direction for want of funds, it obtained complete independence from Paris and State aid from the governments of Indo- and Cochin-China. In 1919 and 1920 its financial turnover was from 70,000 to 75,000 piastres. It is shortly to be housed in new and spacious quarters specially built for it, consisting of three large two-storey buildings and several smaller ones surrounded by extensive gardens. The large number of European residents and the density of the native population, coupled with the unhealthy climate and the great call upon the hos-

¹ Abstracted from the *Journal of Hygiene*, vol. xix, No. 2, October, 1920.

pitals, give wide scope for the activities of the Pasteur Institute. In 1919 alone 400 hydrophobia cases were treated, from 5,000 to 6,000 Wassermann's, blood cultures, bacteriological examinations, &c., made, and a proportionate number of vaccines prepared. A special department is devoted to malaria and another to the study of other diseases. A veterinary service created a year ago has considerably relieved the main establishment but is already becoming overwhelmed with the calls upon it. The chemical department comprises a section for biological chemistry, another for food analysis, and a third, established at the request of planters, for the study of questions connected with rubber growing. The great problem confronting the administration is that of the maintenance of a sufficient staff of experts, for the cost of living is much higher in France and the climate unfavourable.

The Pasteur Institute at Bangkok (Dr. Robert).—The Bangkok branch of the Pasteur Institute was established in 1913 by request of the native rulers as a sequence to the death from hydrophobia of a princess of the royal house. Though still very primitively housed, and staffed almost entirely by natives, it has done excellent work, particularly in handling the rabies problem (which is acute in Siam) and in instituting very successful prophylaxis against plague and cholera. A large donation from the present King of Siam and numerous other gifts have lately been made to the Institute, which was attached to the Siamese Red Cross during the war, and plans have been drawn up for an establishment which, under the guidance of specialists, will be able to deal efficiently with the work entailed by a population of 10,000,000.

Foot-and-mouth Disease in Morocco; Importance of Cardiac Tonics (H. Velu).—In cattle, sheep and pigs alike, the disease is benign for the adults, serious for the young animals. The high mortality among the latter is in the great majority of cases due to cardiac lesions, and when death occurs among adults it is frequently from the same cause. Results obtained from injection of camphorated oil have been encouraging, and the mortality among 200 young pigs showing cardiac lesions was reduced from four to five per day to *nil* by this means.

Malaria at the Saint-Raphael (Var) Aviation Camp during 1919-20 (A. Oliveau).—Black and yellow troops, and French soldiers from Greece, having been quartered at St.-Raphael, where the climate is warm and damp and quantities of *Anopheles maculipennis* exist, fifteen spontaneous cases of malaria were observed during July, August and September of 1919 and 1920 among the 500 men of the aviation camp. Similar cases are now beginning to occur among the civilian population. Malaria existed in the district 140 years ago, but disappeared when the marshes were dried and the port constructed.

Frequency of Latent Forms of Bovine Piroplasmiasis in Morocco (L. Balozet).—Examination of the blood of a large number of Moroccan cattle showing no pathological symptoms of any kind revealed piroplasmids in 40 per cent. Native animals are rarely attacked, and to a mild extent only, by the disease, but it causes considerable loss among imported cattle. The parasites are generally of the *Theileria parva*, *mutans* and *annulata* types, but in the acute stages a large number of pear forms in pairs have also been noticed. Schein observed a similar association of parasites in animals inoculated with bacillary piroplasmiasis at the moment when the temperature reached maximum.

A New Phlebotomus Locality in France (J. Mansion).—The writer was bitten at Bron (Rhône), south-east of Lyons, on August 18 and 19 last. The weather was sultry and stormy at the time and the temperature 22.1° C. and 23.2° C. on the two days respectively. On the 20th the thermometer registered a fall of 7° and the insects disappeared. A captured female could not be identified as *Phlebotomus papatasi*, the only species so far recognized in France.

Juxta-articular Nodules in Algerian Natives. (H. Foley and L. Parrot).—The condition noticed by Jeanselme in Indo-China would appear to be fairly common in Algeria, where it affects all classes alike without any distinction of race, colour, sex, profession or habits. The hypotheses (1) that it is restricted to the coloured races, and (2) that it is due to mechanical irritation arising from the stooping postures natural to Orientals, therefore lack proof. Clinically the nodules exactly resemble those seen elsewhere by other authors. The writer suspects syphilis as the origin of the disease, and in one case obtained distinct improvement after treatment with mercury.

Blood-cell Reactions in Exanthematic Typhus (H. J. Cazeneuve).—The red cells showed no modification either in number or form. The total number of white cells varied from 10,000 to 30,000 per cm. above normal. The percentage of neutrophile polynuclears were in every instance reduced in number, and in some cases were entirely absent from several films examined successively. The basophile polynuclears were generally absent altogether. The number of lymphocytes was invariably below the normal. A great many immature and degenerated cells were noticed, the former being of various types and showing a "shift towards the left," as demonstrated by a predominance of Classes I and II (Arneth's index), the latter resembling Turk's "irritation cells." Seeing that the diagnosis of typhus at present rests upon the clinical symptoms—guinea-pig inoculation being slow and uncertain and Weil's agglutination test non-specific—the author considers that the presence of a definite leucocytosis and a marked neutrophile

myelocyte reaction with neutrophile polynucleosis may be taken as confirmatory evidence.

Treatment of Malaria by a New Method of Intravenous Injections of Quinine (Charles Hartmann).—Forty-three early cases, in whose blood no permanent forms had appeared, were given 0.9 c.c. of a 10 per cent. solution of quinine hydrochloride intravenously. The dose was administered daily during the first week, every third day during the second and third weeks, and once a week for the subsequent three weeks. No crescents and no return of fever occurred during a period averaging from twelve to eighteen months. A slower and more difficult but equally effective cure was obtained in 209 chronic cases, who were given 0.9 c.c. of a 10 per cent. solution of quinine and urea hydrochloride intravenously, daily for the first week, every second day for two weeks more, and then every third day for three weeks; the treatment being continued after patient had left hospital by similar doses once a week for one month, then once a fortnight for two months, and finally once a month for three months. Very fine needles were used and each injection occupied about one and a half minutes. No serious discomfort was ever caused to the patient, and the abscesses which sometimes follow intramuscular injections were not seen. The schizonts, both of *P. falciparum* and *P. vivax*, were found to disappear within twenty-four hours after the first injection. The permanent forms of *P. vivax* invariably disappeared from the peripheral circulation the second day after injection; those of *P. falciparum* showed much greater resistance, and in two instances could only be eliminated by combining the intravenous injections with an intramuscular injection of 0.6 c.c. of a 20 per cent. solution of quinine bihydrochloride. In cases where a comatose condition had been reached, with albuminuria, icterus and signs of hæmoglobinuria, wonderful results were obtained from a combination of the urea and quinine hydrochloride injections with 200 c.c. of a 2.5 per cent. solution of disodic phosphate plus 1 milligramme of adrenalin.

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Observations on Malaria (S. D. Greval).—In the research for malarial parasites the author has noted that using thin films there is a concentration of the parasite-bearing red cells along the borders.

A Haemorrhagic Type of Malaria (B. B. Hajra).—In an epidemic of malaria occurring at Kotkai the author came across several cases of hæmorrhagic malaria. A full description of the condition is given. The treatment consisted in administering intramuscular injections of quinine, pituitrin, and mist. calcii chloride. Two cases of the algid or choleraic type were also observed, and recovered under the same treatment.

Some Notes on Novarsenobillon (Rashmohan Bose).—The author describes the use of novarseno-

billon in cases of syphilis. In 503 cases, 1,221 injections were given with the following results:—

Cured	...	...	...	155
Relieved	...	...	...	244
Otherwise	...	...	...	104

In the number of cases shown as cured no final blood tests could be made for want of laboratory facilities, but the conclusion was drawn from the clinical symptoms of the patients when leaving the hospital.

In seven cases only was a Wassermann test made before discharge. Out of these, two cases were negative, two slightly positive, and the remaining were positive.

Permanganate Pills in Cholera (A. R. Mojumbar, M.B.).—The author advocates the use of home-made permanganate pills rather than imported ones, the former being softer, less bulky, and more easily soluble than the imported pills; the cost of production is a trifle and they keep in good condition for a very long time. The pills are made in the usual way with kaolin and vaseline, but instead of giving them a separate coating they are kept in a bottle containing kaolin in fine powder, which when dry forms a thin crust.

Cachar Sore and its Treatment (J. M. Sen Gupta).—The author deals with several cases of cachar sore which were treated with intravenous injections of tartar emetic solution, the effect produced being extremely satisfactory. A 1-per-cent. solution of tartar emetic in normal saline was injected once a week; the initial dose being 2 c.c., and the maximum quantity given 4 c.c. The infection is a type of leishmaniasis, but a bacillus was also present in large number in the discharge of the ulcers.

Hæmolytic Test in Kala-azar (Charubrata Ray, M.B., B.Sc.).—The author describes a test for the differentiation of kala-azar from chronic malaria. The blood is taken in the same way as for the estimation of hæmoglobin by Gower's hæmoglobino-meter, and mixed with distilled water. There is no hard and fast rule about the proportion of the blood and water, 2 drops of blood to 20 drops of water has been found very satisfactory. Instead of a clear, transparent solution in the case of kala-azar there is turbidity. On keeping the solution for some time a white flocculent precipitate will appear all through the fluid, which later forms a marked deposit. A test-tube of small calibre, a capillary pipette and a little distilled water are all that is necessary to make the test.

Relapsing Fever Epidemic in Sconi District, February to May, 1920 (Siris Chandra Roy, M.B.).—Cases of relapsing fever were treated by injections of novarsenobillon. A dose of 0.3 gm. was given in the case of adults, and proportionately reduced doses in children. Temperature rose to 104° and 105° F. after both intravenous and intramuscular injections, and fell again after thirty hours. Iron and arsenic were administered during convalescence.

Original Communications.

SOME COSMOPOLITAN SUDAN SKIN AFFECTIONS.

- II. MOLLUSCUM CONTAGIOSUM.
III. CHEILITIS EXFOLIATIVA.
IV. MELANOSIS LINGUALIS.

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CONTENTS.—Introductory — *Molluscum Contagiosum*—*Cheilitis Exfoliativa*—*Melanosis Lingualis*—Summary—References—Illustrations.

Introductory.—In continuation of our previous paper on *Herpes Iris*, published in this journal on June 15, 1920, we bring forward a few remarks upon two well-known cosmopolitan skin affections met with in the Sudan, and invite attention to a frequent lingual pigmentation also seen therein.

Molluscum Contagiosum.

This disease, which is also known as *Epithelioma molluscum* or *Epithelioma contagiosum*, or because it was believed to have some resemblance to the vesicular stage of small-pox, *Acne varioliforme*, is not uncommon in Khartoum.

At times it has given rise to doubts as to the correct diagnosis, and therefore we think that perhaps some illustrations of its appearance in the black skin may be useful.

Historical.—In 1793 Ludvig wrote an account of a peculiar dermal condition found in a man named Rheinhard from Mühlberg. In describing this disease, Ludvig used the following sentence:—

“Verum enim Rheinhardi visu foedem corpus tectum est verrucis mollis sive molluscis et madidis sive myrmecus.” The word “molluscis” is obviously derived from the adjective “molluscus,” which means soft, and luckily, Ludvig’s description is supplemented by three illustrations made by Tilesius, which indicate that the disease under consideration is the same as that called to-day *Molluscum fibrosum* or *Fibroma molluscum*.

In classifying this case Willan placed it in his order “Tubercula” and named it “Molluscum,” which is a substantive used by Pliny for a fungal growth on the maple. In this way the rather peculiar term became established in dermatological literature.

Later, Willan met with a similar case himself, and this is illustrated in fig. 3 of Plate LX of Bateman’s atlas, being named *Molluscum pendulum*.

Bateman gave this form the distinguishing appellation “pendulum” because he had met with a disease which was unknown to Willan, and which he termed *Molluscum contagiosum*. This disease was an excrescence characterized by its contagious quality and by the emission, under pressure, of a milky fluid from an imperceptible aperture at the

apex. He laid especial stress upon the contagiousness of the affection, and his reasons for doing so were:—

- (a) His first case, a nurse, became infected from the child whom she nursed. This child was said to have been infected by a previous nurse who was believed to have carried the disease to two other children.
- (b) His second case was in a child who had acquired the disease from an older child.

Bateman describes the eruption as consisting of tubercles, hard and smooth, of nearly the same colour as the skin of his patients, but possessing a shiny surface and a slight appearance of transparency. They were globular or oval in form and sessile on a contracted base. He illustrates the condition in Plate LXI of his atlas.

From this date onwards, and for many years, considerable doubt was expressed from time to time by competent observers like Erasmus Wilson, Hebra, and Kaposi as to the contagiousness of the disease. This was, however, definitely settled by the successful inoculations performed first by Peterson in 1841, and subsequently by a large number of observers; most of them also recorded failures.

It became generally admitted that the disease was contagious from man to man, but this did not solve its peculiar epidemiology, for although epidemics have been recorded in institutions, and in houses, and although infection, from man to man, has been traced through the agency of public swimming baths, Turkish baths, &c., there remains the curious fact that the disease arises without evident human infection, and naturally the suspicion was early aroused that perhaps the true source of infection was from some animal.

It has long been known that there exists a contagious disease among poultry called sore head, or *Epithelioma contagiosum*, which is characterized by the presence of warty nodules on the unfeathered parts of the head and neck, and may occur on the legs, the abdomen, under the wings, and near the cloaca. The disease may progress and cause death, which may be expedited by an attack of avian diphtheria which, of course, is quite a different disease and well known in Khartoum, where the *Epithelioma contagiosum* is rare. This disease is known to occur in fowls, turkeys, geese, pigeons, turtle doves, buntings, linnets, and is believed to occur in sparrows. It is well known in Europe, America, South Africa, and the Hawaiian Islands, and probably exists all over the world.

The observations of Colcott Fox and Shattock tend to show that, histologically, the lesions in birds are comparable to those in man, though, of course, on superficial examination, they do not resemble one another. The epidermis in both diseases becomes thickened, and its cells undergo the same peculiar degeneration resulting in the formation of the peculiar homogeneous masses illustrated in fig. 4 of this note.

It is alleged that Bollinger and Csokor have

inoculated material from the *Molluscum contagiosum* of man into the comb of a bird, and produced a disease identical with the Epithelioma of birds. We have been unable to obtain this reference in Khartoum, and we have failed to find any confirmatory experiment in the literature at our disposal here, but it must be admitted that, from time to time, observers have brought forward cases bearing evidence of the disease having been contracted from birds, but none of these have been absolutely proved beyond question. The contagion is believed to spread naturally from bird to bird by contact, but it might be done by the agency of drinking water, as has been suggested by Archibald.

We, therefore, have reached the point at which it is admitted that there exist two contagious diseases, one in man and the other in birds, which may perhaps be one and the same complaint.

As to the nature of the disease in birds, it is true that all kinds of organisms have been accused, but it was not until Marx and Sticker performed their experiments in 1902 that the true cause was discovered.

As inoculations of the juice from the lesions of one bird can produce the disease when rubbed into scarified areas of other birds, they attempted to find whether this contagium vivum could pass through filters, and found that it passed through a Berkefeld candle, but was stopped by a Chamberland "F" filter. They also found that it existed in the blood and in apparently healthy internal organs.

These results were confirmed by Juliusberg in 1904, who gave fourteen days as the incubation period of the experimental disease in filtered infections and only five days in direct infections. In the same year Borrel first described minute particles in smear preparations from the lesions. In 1908 Lipschutz gave illustrations of the minute granules found in Epithelioma contagiosum of pigeons and in the *Molluscum contagiosum* of man. These illustrations may, with advantage, be compared with those described and figured by Bradford, Bashford and Wilson in 1919 as occurring in human polymyositis and influenza.

Following his experiments on birds, Juliusberg in 1904 and 1905 proved that the contagium vivum of the human disease could pass through a Berkefeld filter, and that the filtrate so obtained could reproduce the disease in man. In 1908 Serra confirmed Juliusberg's results and also Lipschutz's observations as to the presence of the minute particles colourable by Giemsa's stain. In his case the period of incubation was ninety days. In 1919 Wile and Kingery confirmed these experiments. The period of incubation in their second case was twenty-one days, and true molluscum bodies were found in the lesions somewhat later. There is, therefore, a suspicion that *Molluscum contagiosum* may be the human representation of the more severe disease *Epithelioma contagiosum* of birds, and that both are caused by a filterable virus.

The history of the causal agent, however, is not as simple as that given above, because it was complicated with suggestions that this agent might be a protozoon or a bacterium.

Protozoon Theory.—In 1841 Patterson discovered the molluscum bodies which he thought were nuclei, but which von Bärensprung, Virchow, Boeck, Török and Tommasoli demonstrated to be degenerate epithelial cells, though other observers, such as Klebs, Hardy, Bollinger and Neisser, held them to be parasites.

Bacterium Theory.—In 1881 Anglucci described his *B. lepogenum* as the causal agent. In 1892 Graham found a coccus, while White and Robey in 1902 came to the conclusion that neither they themselves, nor anyone else, had demonstrated a causal parasite.

In regard to the histology this has been investigated by numerous workers, many of whom, including Rokitsky, Virchow, Ranvier, &c., believed in a sebaceous gland origin of the growth, while Klebs, Bärensprung, Bizzozero, Simon, Retzius, Török and Tommasoli, Unna, Crocker and others showed it to be of rete origin.

This brings the history of the disease as up to date as our meagre literature in Khartoum permits, and we will now turn to our own cases.

Khartoum Cases.—We have selected two of our Khartoum cases to illustrate the features of the disease. Fig. 1 shows a typical area for the development of the spots, viz., around the generative region in an adult soldier, while fig. 2 indicates another favourite situation, viz., the face. In regard to this latter photograph, note how young some of these lesions are as compared with the majority seen in fig. 1. Fig. 5 indicates the main features of the eruption, viz., the sessile excrescence situated on a constricted base, in colour pale in comparison with the black skin in the background, somewhat of a pearly appearance, being shining and translucent, with an apical depression leading into the centre of the excrescence. In fig. 2 it will be observed that this apical opening is often apparently absent, but this is only due to its being closed by epithelial debris. It will be observed that in this figure some growths are shown near to and on the red margin of the lower lip, which is a site rarely selected. If squeezed a whitish mass can be expressed from the aperture.

Morbid Anatomy.—If a vertical section of one of these tumours (fig. 3) is examined, it will be seen that, except at the base, it is everywhere covered by an epidermal layer which, running over the projection, turns inwards at the dimple or orifice at the apex of the tumour. It now runs downwards in the reverse direction until it reaches the base of the tumour, along which it rests on the corium. Casual examination does not reveal any great change in the outer epidermal covering, while that portion which occupies the interior of the little growth is strikingly different from the normal.

In considering the morbid anatomy we have four distinct areas to examine, viz.:—

- A. The Superficial epidermis.
- B. The Internal Epidermis.
- C. The Corium.
- D. The Central Cavity.

A. *The Superficial Epidermis*.—Commencing at the base of the growth, this epidermis is found to be fairly normal in structure and to possess actively dividing cells, while pigment granules are also *en evidence*.

As the epidermis is traced forwards over the tumour (figs. 3 and 6) it will be noticed that the pigment disappears, the papillæ flatten and cease to exist, and that the stratum corneum is much reduced in some specimens. A combination of all these factors probably explains the pearly white appearance of the growths.

We have always found a stratum lucidum, and in this we differ from White and Robey, while the stratum granulosum of our specimens has been thin.

A more important change, however, is the formation of vacuoles in the cytoplasm of the cells of the rete. This vacuolization pushes the nucleus of the cell to one side, as a rule, and reduces it to a rim or band of chromatin. More rarely, the change is circumnuclear. The vacuole may be absorbed, leaving a shrivelled cell containing a dense nuclear mass, or it may become wholly, or partially, filled by a more solid substance, the nature of which is not obvious. The stratum germinativum is fairly normal.

At the apical opening this epidermis turns downwards and becomes the internal epidermis. Before, however, considering this portion of the specimen it may be as well to note the absence of sweat glands, hair follicles and their attendant glands, and of cellular infiltration into the connective tissue under the superficial epidermis (figs. 3 and 6).

It will be noted that the bases of the superficial and internal epidermis (figs. 3 and 6) are joined together by this connective tissue, which is continuous with that of the corium.

B. *The Internal Epidermis*.—If attention be paid to fig. 3, it will be seen that this epidermis, in its course from the apex to the base of the growth, becomes much thickened, and that these thickenings increase in depth gradually as the base is approached. Further, it is noticed that this epidermal growth is not continuous but distinctly lobulated.

The smallest of these epidermal thickenings is to be found close to the apex of the growth. It will be observed that the germinal cells, instead of merely growing outwards, extend into the connective tissue, which is here distinctly loose in texture.

These backward growths are not continuous, but are divided into lobes. The lobulations are caused by the growths meeting blood-vessels, surrounded by a slight amount of connective tissue, which resist the growth of the advancing column of cells and deflect it in two directions (fig. 6). These vascular areas, however much they may resemble papillæ, bear no relationship to the original papillæ of the

skin which, as we have already noted, disappear before the orifice of the growth is reached.

The lobulation is, therefore, purely nutritional. It, however, produces an appearance which, long years ago, induced many observers to believe that the whole growth was merely a dilated and enlarged sebaceous gland.

We have, therefore, two distinct parts of the internal epidermis to consider, viz., the lobular epithelium and the interlobular spaces.

(1) *Lobular Epithelium*.—Turning now to the lobular epithelium itself, we note in fig. 7 that the stratum germinativum is composed of well-defined cells resting upon a connective tissue basis which is fairly well supplied blood-vessels.

From this germinal layer there arise two types of cells, viz.:—

(a) *Molluscum cells*.

(b) *Non-molluscum cells*.

(a) *Molluscum cells*.—If fig. 7 is examined, it will be seen that almost immediately above the germinal layer certain cells become vacuolated, much in the same way as in the superficial epidermis. In this case, however, the vacuole formation is more extensive and the cell becomes much distended.

The vacuole now becomes gradually filled with a granular deposit (fig. 7), and in this process may become divided into two or three small vacuoles, while the nucleus is driven to the periphery of the cell, and is more or less flattened.

Gradually the whole vacuole becomes filled with the granular debris, and now appears a very distinctly horny-looking cell wall enclosing the granular contents and the nucleus or its remains.

Further out, however, another change depicted in fig. 8 takes place. This consists of the appearance of lumps of a translucent-looking substance in among the granules. At the same time the wall of the cell thickens and becomes horny.

Still further out, figs. 4 and 9, these lumps run together into one homogeneous mass enclosed by the horny wall, against which the flattened remains of the nucleus are pressed. At this stage a few granules are visible in the otherwise homogeneous mass. This is the stage at which the cells are called "*Molluscum Bodies*."

Further outwards, towards the cavity of the growth, the tissue between these bodies becomes loose and granular, and finally the molluscum bodies lie free in a granular matrix containing the remains of the horny cells.

In this final stage a molluscum body is composed of a clearly defined limiting wall enclosing almost homogeneous contents in which a few granules can be seen.

These bodies are probably in some way connected with the filterable virus which will be mentioned below.

Still further out, the limiting wall breaks and disappears. The homogeneous substance breaks up and helps to increase the granular debris in the centre of the growth.

- (b) *The Non-molluscum Cells*.—Turning again to fig. 7, it will be noted that all cells do not become molluscum bodies, but, on the contrary, as they pass out form a stratum granulosum (fig. 9) composed of several layers of cells containing large keratohyaline granules. Further out, these develop into horny cells.

(2) *Interlobular Spaces*.—Turning now to the interlobular spaces, they will be seen to contain a blood-vessel and a slight amount of connective tissue, and to be bounded, laterally, by lobular epithelium as is seen in fig. 4, and, to a certain extent, at the left hand of fig. 7.

The epithelium covering the distal end of an interlobular space is, however, quite different from the lobular epithelium. In its earliest stage, when the interlobular space is broad, it is thin and composed of stratum germinativum, rete, stratum granulosum, which gives rise to a large mass of horny cells. When, however, it covers a compressed and, therefore, older interlobular space, it is also compressed, and the stratum germinativum appears to be composed of elongated cells. The rete is apparently normal, but the stratum granulosum is thickened and its granules are larger than usual, while the stratum corneum is elongated into a sort of cap extending far into the cavity of the growth.

C. The Corium.—This is seen lying at the base of the growth in fig. 3. From this position it extends forwards between the superficial and the deep epidermis to the orifice of the growth, where it is checked by the backward bending of the superficial epidermis. It is continuous with the connective tissue of the interlobular spaces.

It will be noted that it shows no cellular exudation, no hair follicles, and no sebaceous or sweat glands.

D. The Central Cavity.—This is shown in fig. 3 as a space enclosed by the growth and communicating with the exterior by the orifice at the apex of the little tumour. This orifice may, however, be closed by epithelial debris.

The contents of the cavity will be seen to vary. Near the epithelium it contains molluscum bodies (very clearly shown in figs. 3 and 4) and horny cells. Further away from the epithelium, it contains a whitish mass composed of debris of broken-down molluscum bodies and horny cells, as well as of granules which will be considered in the next section.

Etiology.—As indicated in the history, the disease has been proved to be contagious by its spread from person to person, and this we have

noticed in a battalion, but the infection was not great. It can also be spread experimentally by inoculations from man to man.

We confined our experiments to animals in which we inoculated shaved and scarified areas of monkeys (*Lasiopyga callitrichus* I. Geoffroy 1851) and of dogs. Unfortunately, all our experiments were negative, and we have been unable to repeat our observations.

As to the causal agent, smears made by taking scrapings, as aseptically as possible, from deep in the base of the tumour when coloured by Gaudechau's stain show, very clearly, Borrel's coccoid bodies (fig. 10) which are capable of passing through a Berkefeld filter, but not through a Chamberland F. bougie. These bodies measure some from 0.4 to 0.5 micron or thereabouts, and are comparable with those shown in fig. 1 of Lipschutz's plate. So far, all attempts at culture, including our own, have been failures, but this dusty climate makes anaerobic cultures on the lines of Noguchi's method difficult, as aerial contaminations are apt to occur.

Suspicion, therefore, rests upon Borrel's bodies as being the causal agent, but this, so far, has not been fully proved.

Pathology.—The pathogenesis of the curious picture shown in fig. 3 is difficult to explain.

The cardinal features of the growth are these:—

- (a) The youngest lobules are at the apex, the oldest at the base (figs. 3 and 6).
- (b) The skin covering the whole growth is abnormal, as has been indicated above (figs. 3 and 6).
- (c) The epitheliosis begins by a downgrowth into the corium (fig. 6), which is soon checked by firm connective tissue (fig. 7), while it becomes lobulated owing to the intervention of blood-vessels (fig. 6).
- (d) The epidermis of a given lobule grows outwards as well as downwards, but at the same time the cells swell laterally, and this elevates the abnormal skin on each side of the growth, thus making a pit in which the epithelial debris accumulate.
- (e) This accumulation, increasing in amount, expands the little tumour so formed, while the development of new lobules increases its height and causes the covering and abnormal epidermis to be stretched over the growth.
- (f) The relatively feeble blood supply prevents the growths developing for long, as a time is apt to come when there is insufficient nutrition, and then the growth ceases and the little tumours shrivel and drop off.

The whole process is therefore an epitheliosis or growth of epithelium in which the downward prolongation into the corium is readily checked and produces no reaction therein, but anchors the growth. The outward growth gives rise to the molluscum bodies and the horny cells which form a mass of debris, while the lateral expansion raises the neighbouring epidermis into the outer covering

layer, which naturally turns downward at the margin of the growth. In this way the debris is enclosed in an open sac. The disease, being contagious, well merits the name *Epithelium contagiosa* given to it by Virchow and used by Neisser and Unna.

Diagnosis.—Figs. 1, 2 and 5 show the main characters of the developed eruption better than words can express, and fig. 2 indicates the same for the young growth; it is, therefore, unnecessary to detail the salient characters again.

In regard to differential diagnosis, experience teaches that it is necessary to distinguish it from discrete modified small-pox nodules and vesicles, though this may be doubted by the reader. It has also to be distinguished from small fibromata, milia, and small warts.

From *small-pox papules* and vesicles it may be distinguished by the absence of constitutional symptoms, by the presence of the pearly whiteness, of the dimple or opening at the apex, and by expressing a whitish material from the interior which, on microscopical examination, reveals molluscum bodies and provides a visible but filterable virus.

From *small fibromata* by the eruption not being very numerous and by the characters just given above.

From *milia* by the larger size of the eruption and the presence of the central depression.

From *small warts* it may be recognized by the presence of the central aperture, the whitish expressible material, and by the translucent pearly colour.

Prognosis.—The growths do not spread much in our experience in the tropics either on the individual or to other people, and they cause no danger to life.

Treatment.—The small tumours can be cut away, or in situations where this is not desirable can be opened by a knife, scraped and treated by pure carbolic applied by means of cotton-wool and a thin piece of wood.

Cheilitis exfoliativa.

In June, 1919, Foerster, in the chairman's address to the Section of Dermatology of the American Medical Association, complained that disorders of mucous membranes in continuity with the skin and having close structural relationship therewith ought to be included in a complete dermatological investigation. This practice, he states, is more often omitted than observed, and he particularly invites attention to the oral cavity.

If this is so, there can be no doubt that it is not due to the teachings contained in the text-books, because the 1916 edition of Stelwagon considers this point carefully under different diseases, and in addition devotes fifteen pages to those not otherwise considered. In regard to tropical diseases, the new edition of Castellani and Chalmers deals with these matters on pages 1740-1749 and 2283-2284. Nevertheless, there may be some truth in Foerster's statements, and therefore, with a view to stimulating interest in these matters, we bring forward the following remarks:—

We have already invited attention to *Cheilitis exfoliativa* as seen in the Sudan in a paper published in this journal on October 1, 1918. The case then recorded was of a mild but very resistant type. It was illustrated in fig. 7 of the plate attached to the paper in question. *Cheilitis exfoliativa* is, however, far from being rare in the Sudan, possibly because it is associated with seborrhœa, which is quite common.

This disease of the lips appears to have been first described by Willan in 1808 under the term *Psoriasis labialis*. In 1835 Rayer gave a good account of it under the name *Pityriasis des lèvres*. In 1900 Besnier illustrated the complaint in a coloured plate in Volume II of "*La Pratique Dermatologique*." Stelwagon has especially studied the affection and given photographic illustrations thereof, while Little, MacLeod, and others have demonstrated the disease in the Royal Society of Medicine.

In regard to this disorder in the tropics but little appears to have been written, as we are only acquainted with the reference in Castellani and Chalmers' Manual.

If fig. 11 is cut away from Plate II and placed in an ordinary stereoscope, it will be observed that both lips are somewhat swollen and covered with whitish crusts. It will further be observed that the lower lip is much more affected than the upper.

As to the causation, there were evident signs of seborrhœa, so that this case again supports Stelwagon's views on this subject.

Our previous case has proved most difficult to treat, but the present condition was speedily remedied by the application to the lips of lactic acid, used at first diluted, and later in the pure undiluted condition.

Melanosis lingualis.

If the tongues of natives in the Sudan are examined, many will be found to have unpigmented tongues, while others have pigment on the tips of the papillæ, on the anterior third of the tongue, and along the lateral margins thereof.

If fig. 11 is examined stereoscopically with special reference to the portions of the tongue which are visible, it will be observed that it is dark in colour, and that the pigmentation is caused by black spots.

When scrapings are examined, cells, pigment granules and micro-organisms are to be seen, but these latter are obviously ordinary mouth organisms, and nothing in the form of a causal germ can be found on cultivation.

The condition is probably nothing more or less than natural pigment deposited in some excess, because we find it to be marked only in 14 per cent. of the cases we have examined, but present in some degree in no less than 27 per cent.

It is quite different from *Lingua nigra* or Black Tongue, which is the name applied to an area of discoloration, often beset with filiform projections situate in front of the circumvallate papillæ, and associated with the presence of a cryptococcus or a nocardia, or both.

The slight but striking hyperpigmentation to which we now draw attention is so commonly met with that it must be looked upon merely as a slight excessive variation from the normal in Sudanese, and may be termed *Melanosis lingualis*. It differs markedly from the diffuse darkening of the inside of the cheeks.

Rhartoum,

November 28, 1919.

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ILLUSTRATIONS.

PLATE I.

- FIG. 1. — Molluscum contagiosum showing distribution around the generative organs. Photograph. Reduced.
- FIG. 2. — Molluscum contagiosum on the Face. Photograph. Reduced.
- FIG. 3. — Section through a molluscum growth to show the aperture, the central cavity, the lobular epithelium, the superficial epithelium and the basal attachment. Photomicrograph. $\times 15$ diameters.
- FIG. 4. — Section showing an interlobular papilla, the lobular

epithelium and the cavity filled with molluscum bodies. Photomicrograph. $\times 100$ diameters.

FIG. 5. — Molluscum contagiosum showing the pearly white appearance, the restricted base, and the central dimple or aperture. Photograph. Very slightly reduced.

PLATE II.

FIG. 6. — Section of wall of a growth close to the aperture. Note the superficial epidermis, the corium, the downgrowths forming the lobular epithelium, and the molluscum bodies. Note especially that the lobulation in the downgrowths is due to the intervention of vessels. Photomicrograph. $\times 100$ diameters.

FIG. 7. — Lobular epithelium showing the commencing degeneration in cells attacked by the virus. Photomicrograph. $\times 300$ diameters.

FIG. 8. — Homogeneous degeneration commencing in the infected cells. Note the thick cell walls. Photomicrograph. $\times 450$ diameters.

FIG. 9. — Lobular epithelium showing the stratum granulosum. Photomicrograph. $\times 150$ diameters.

FIG. 10. — The granules of Borrel which represent the filterable virus. Photomicrograph. $\times 800$ diameters.

FIG. 11. — Stereoscopic photographs to show Cheilitis exfoliativa and Melanosis lingualis.

Please remove these photographs from the plate by cutting along the line AA. Place the photographs so removed in a stereoscope when the lesions will show clearly. Stereoscopic photographs. Reduced.

TWO CASES OF GANGOSA IN NATIVES OF THE SOLOMON ISLANDS, WESTERN PACIFIC.

By NATHANIEL CRICHLAW, M.B., Ch.B.Glas.

Government Medical Officer, British Solomon Islands.

GANGOSA is defined by Castellani and Chalmers as "an ulcerative condition of the palate, nose, pharynx, and skin surfaces of the body, of unknown cause, which slowly spreads to the nose and larynx, destroying cartilage and bone, and causing much deformity."

The disease seems to be mainly confined to the Pacific Islands. Cases have also been met with in Central America, West Indies, Ceylon and Equatorial Africa.

ETIOLOGY.

The etiology of the disease is unknown. The condition is regarded by some as a late sequel to yaws, and by others as being a manifestation of syphilis, tuberculosis and leprosy.

Dr. Anton Breinl, Director of the Australian Institute of Tropical Medicine, as the result of investigations by him, has come to the conclusion that the disease is a blastomycosis due to a cryptococcus, which he proposed to call the *Cryptococcus mutilans*.

Smears were taken by me from the secretion of the ulceration, but the organisms found were chiefly pyogenic germs, which I regarded as secondary infections.

From the result of my treatment, I have come to the conclusion that gangosa is caused either by a Spirochete or by a Leishmania.

SYMPTOMATOLOGY.

Manson states that the disease "generally commences as an ulcer on the soft palate. Slowly

PLATE I.

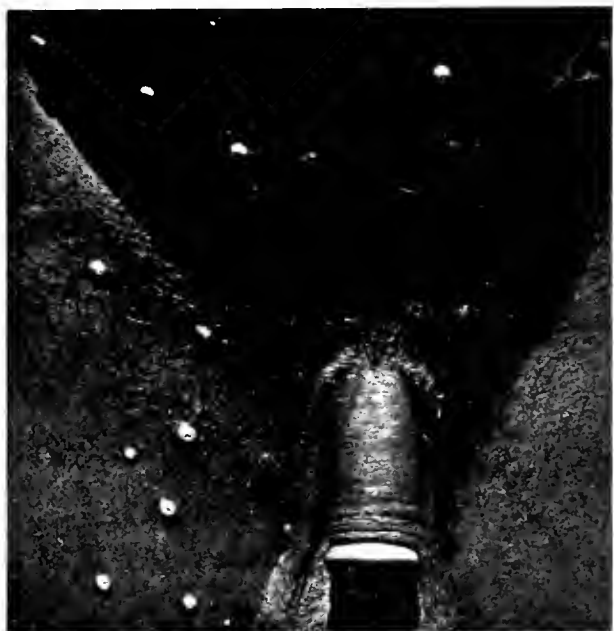


Fig. 1.



Fig. 2.

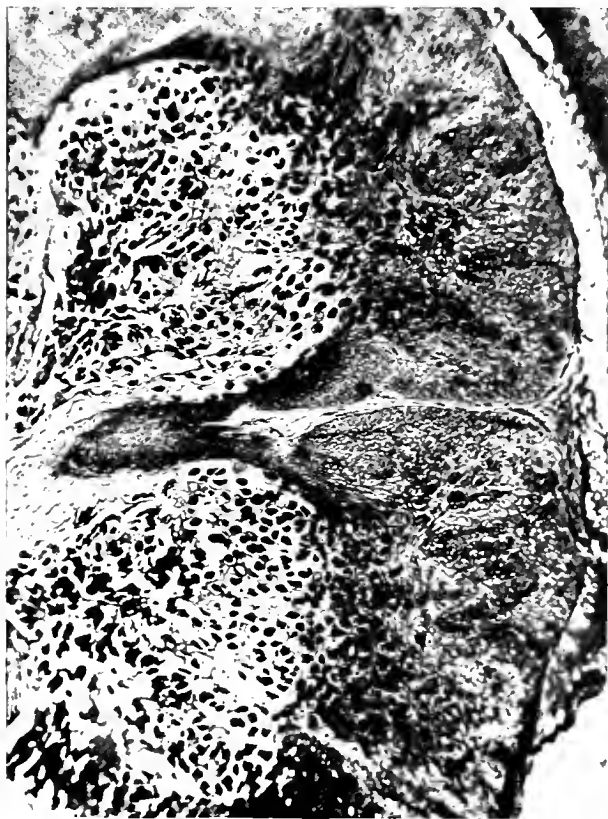


Fig. 4.

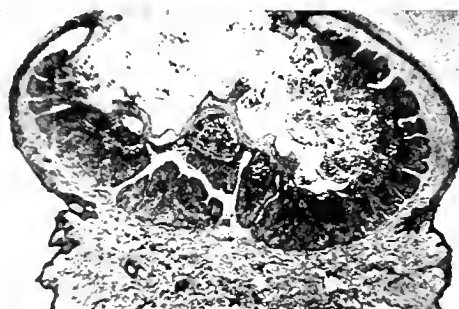


Fig. 3.



Fig. 5.

PLATE II.



Fig. 6.

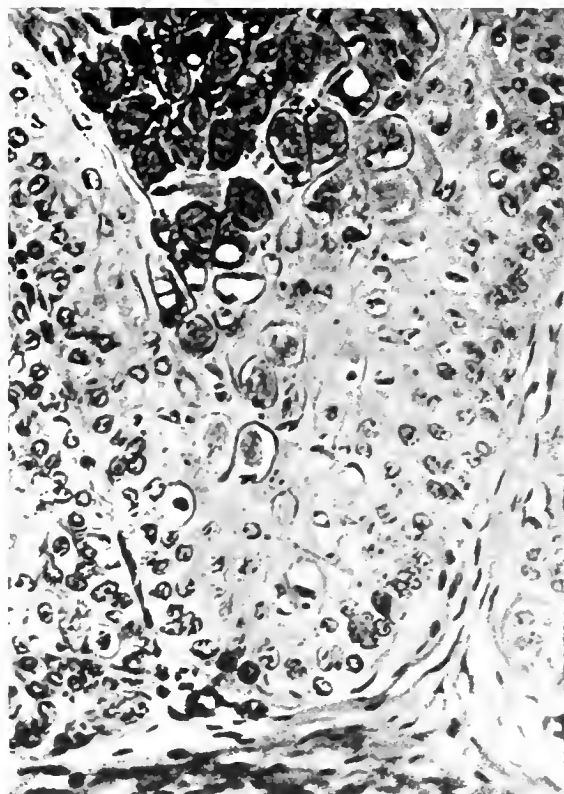


Fig. 7.

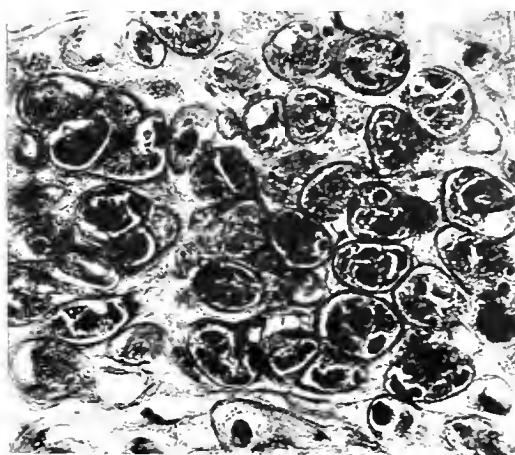


Fig. 8.

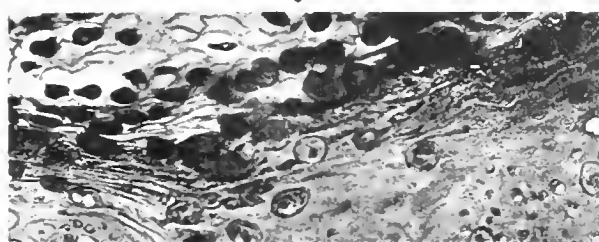


Fig. 9.



Fig. 10.



Fig. 11.



spreading, it may make a clean sweep of the hard palate, of the soft parts, cartilages and bones of the nose, sparing the upper lip, which is left as a bridge across a great chasm, the floor of which is formed by the intact tongue." According to Castellani and Chalmers the disease "begins as a sore throat, and on examination a nodule may be seen on the back of the pharynx, the posterior pillars of the fauces, or the edge of the soft palate. This becomes a superficial ulcer covered with a brownish-grey slough. This ulcer spreads rapidly at first, but more slowly later, and eats away first the soft parts, and then the bone of the palate, the nasal septum, and the cartilages of the nose, so that the skin falls in, and the nose and mouth are converted into one cavity. It may then extend on to the face or lip, or affect the larynx.

"The ulceration may progress continuously for a period of ten to thirty-five years, or it may advance at certain times and be quiescent at others, or it may cease at any time, leaving a chronic ulcer."

From my cases, I formed the opinion that the condition started as an ulcer on the upper lip just below the nose. From there it spread over the upper lip and lower part of the nose, destroying the alæ and cartilaginous septum of the nose. Then it extended deeper and affected the bones of the nose and hard palate.

In my cases, neither the soft palate nor pharynx was affected. The chief seat of ulceration was the upper lip. The ulceration presented itself as a thick granulomatous fungating sloughing mass with irregular edges, covered with a greyish purulent secretion, and very foul smelling. The tissue in the neighbourhood of the ulceration was swollen.

In Case 1—adult male—the external appearance of the nose was little affected, but there was a clean punched-out perforation connecting the nasal cavity with the buccal cavity. The lower lip was also slightly affected by the ulceration.

The condition, according to the native, had been present one-and-a-half years. In Case 2—adult male—the whole of the lower part of the nose was affected and was eaten away by the ulceration. The hard palate and pharynx presented no abnormal features.

The native stated that the condition had been present for five years.

Briehl divided cases of gangosa met with in New Guinea into three groups.

Firstly: Early cases in which the patients had been ill for a few months only, and where a small area of the skin of the face was found to be affected. The cartilaginous septum had been destroyed but the disease had not caused any extensive destruction of the bone.

Secondly: Cases in which the ulceration had advanced further. Large areas of the face were found to be the seat of extensive weeping sores. The bone near the affected parts had been implicated, and the disease had led to the destruction of the skeleton of the nose and hard palate.

Thirdly: Cases in which the active ulcerating process had come to a standstill. Extensive cicatrization had taken place at the seat of the ulceration; as a rule the

nose had disappeared, and was represented by a smaller or larger opening.

TREATMENT.

With regard to treatment, very little is mentioned by Castellani and Chalmers, or by Manson.

I adopted two different methods of treatment in my cases.

Case 1. Colloidal antimony— $\frac{1}{2}$ c.c.—was injected intravenously twice weekly, with an interval of three days between the injections. The ulceration was bathed daily with a weak solution of potassium permanganate.

After the first week the ulceration showed signs of healing. The secretion became less and was not so foul smelling, and the ulceration became "clean."



CASE 1.—Before injections of colloidal antimony.

After the second week the ulceration was nearly healed, and after the third week the ulceration was completely healed. The perforation in the hard palate had closed up.

Six injections of colloidal antimony were given.

As an adjunct treatment, potassium iodide, 5 gr. three times daily, was also given.

Case 2. Galyl was here used instead of antimony. It was administered intramuscularly. One dose of 15 cg. was given weekly.

Only three injections were necessary, as after the third injection the ulceration had completely healed.

The ulceration was also washed daily with a weak potassium permanganate solution and potassium iodide was also given.

In healing, the lower part of the nose had completely disappeared and was represented by a small opening.



CASE 2.--Healed. Showing scar left.

The result of the treatment adopted by me in these two cases made me come to the conclusion that gangosa is a disease caused either by a Spirochæte or by a Leishmania.

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A BRIEF NOTE OF THE HISTOLOGY OF GOUNDOU.

By W. A. YOUNG, M.B., Ch.B., D.P.H., D.T.M.

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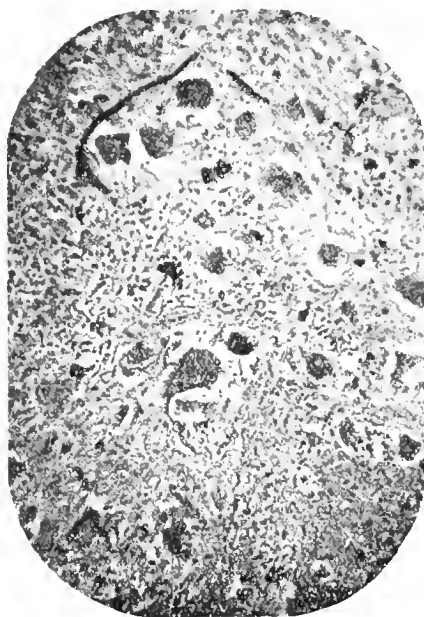
ALTHOUGH goundou is not rare, and although many descriptions have been given of the gross and visible pathology and outward appearance of these tumours, very little is definitely known of the in-

ternal structure and nothing at all of the producing cause.

Fly larvæ have been suggested as a possible origin, but this is ruled out by the symmetry of the affection and by the observation of certain observers who state that many bones of the skeleton may be so affected. A similar condition has been observed in yaws by Brumpt, but while the yaws condition can be ameliorated or cured by the administration of iodides or salvarsan, the condition of goundou cannot.

Recently Dr. Aitken, of the Creek Hospital, Lagos, sent the author a goundou tumour which he had removed. On sectioning the following condition was seen:—

The general appearance was that of myxomatous tissue.



Section of goundou tumour. $\times 200$.

The cells were mainly of a round type, but here and there were what appeared to be early fibroblasts. These cells were laid in a thin matrix of mucoid ground work. Here and there thin-walled blood-vessels were visible. The walls consisted of one layer of cells only and at times these walls had given way allowing hæmorrhage to occur. They varied in size, some containing six red cells, and others as many as thirty.

But the main characteristic was the scattered groups of condensed protoplasm having no definite edges and being attached by processes which gradually thinned out into the surrounding material.

In these condensations from one to twenty or thirty nuclei could be made out. At first, under a low power, one was tempted to think this was some protozoon showing segmentation, but higher powers quickly showed what it really was. In some cases at the edges of these protoplasmic masses a nucleus

could be seen surrounded by protoplasm and ready to be separated except for a small attachment from the parent tissue.

There was no appearance of cartilage formation nor of osseous structure. One is tempted to suggest that this tissue is of embryonic origin and by its growth is sufficiently strong to force the thin-growing nasal region bones outwards but not strong enough to cause necrosis, and this is more readily understood when one considers its vascularity which would give the stretching periosteum as much blood as is required for the formation of the extra area of bone. The fact that goundou occurs during the first two decades of life rather supports the embryonic idea. The photomicrograph is taken of a part of a slide which shows particularly these protoplasmic condensations.

The mass towards the centre actually contained eighteen nuclei. Magnification 200.

SOME REMARKS ON THE DEVELOPMENT OF THE LEISHMAN-DONOVAN BODIES.

By J. E. R. McDONAGH, F.R.C.S.

IN 1915 [1] I showed the microscopic specimens of a case before the Dermatological Section of the Royal Society of Medicine, labelled "*Coccidiosis avenerca*," which were illustrated later in my "Biology and Treatment of Venereal Diseases" [2]. The clinical history of the case was shortly as follows: A man, aged 22, fell while playing hockey in the North-West Frontier Province (India) and injured his knees and right elbow. The knee wounds rapidly healed, but at the periphery of the elbow wound a rash developed, followed by a "go of fever" which lasted for three weeks. When I saw the patient some months later the elbow wound had healed in the centre, but around were discrete granulomatous papules not unlike syphilitic papules surrounding a healed primary sore. There were also similar papules affecting the glans penis, the corona and the under surface of the prepuce. There was no evidence of syphilis and the C.F.T. was negative. Histologically the papules were found to be of lymphatic origin. Each papule was sharply circumscribed and divisible into three areas—an outer layer of plasma cells, then a layer of mixed plasma cells, lymphocytes and endothelial cells, while the centre was occupied in the main by endothelial cells. In the intermediary zone were to be found intra- and extra-cellular parasitic bodies, which I took to be the asexual development of a coccidial protozoon. I forgot all about this case till Dr. L. D. Shaw gave me a case of "Aleppo Button" from which he had obtained in film the Leishman-Donovan bodies. This patient had a central raised lesion on the arm, not unlike a papulo-erosive chancre in which there had been no loss of surface. Around and radially situated were discrete papules which had undoubtedly arisen by direct extension, presumably by the lymphatics, from the central and

primary lesion. Dr. Shaw excised the whole and I cut several sections of both the central and the peripheral lesions. The histological picture of the central lesion was not unlike the type of syphilitic primary sore just mentioned, except that it was much more sharply circumscribed; in fact, there was practically no cellular infiltration around the spurious fibrous capsule which encased the lesion. The lesion was well divided into the three areas above described and in the middle zone I found parasitic bodies which at once reminded me of the case I had described in 1915. In the central endothelial zone there were a few areas of necrosis in which several Leishman-Donovan bodies were to be discerned. The peripheral lesions had the same structure in strand form. The central endothelial zone was very well marked and appeared to be of lymphatic origin. The parasitic bodies were to be found in this zone and only on the surface where the epithelium had been destroyed were areas of necrosis to be found. The characteristic features of the lesions were undoubtedly the tri-zoned arrangement and the minimal amount of inflammation which occurred around.

About the same time I had under my observation a man, aged 52, from Mysore, who for over 20 years had never been free from cutaneous lesions which appeared suddenly, as small papules, to become furuncles, then ulcers, and finally heal up when the crust had fallen off, leaving a deepish scar. The patient had had altogether over 200 lesions, but they had never prevented him from doing his work. Being a medical man he had been seen by everybody, but the diagnosis of Leishmaniosis had always been considered untenable. I persuaded the patient to let me excise a lesion when it was two days old, and I cut serial sections of the same with the following result: In the centre the epithelium had been thinned down and underlying it was an area of necrosis in which Leishman-Donovan bodies were to be found. On either side the epithelium was hypertrophied, but below it and separated from it by a diffuse small round-celled infiltration was a dense zone of discrete and well-staining endothelial cells, which also formed the base of the necrotic area. Descending into the subcutis this endothelial zone was found to taper off into a blood-vessel, the wall of which was composed in the main of small round cells. The intra- and extra-cellular parasitic bodies were to be found mostly in the mantle of this blood-vessel and sparsely in the zone between the epithelium and the endothelial cells on either side of the necrotic area.

Another type of case I also had under observation affected a man, aged 35, who contracted a sore on his left cheek in Baghdad. When I saw him some five months after he had been infected he presented an irregularly heaped-up ulcer not unlike a framboesiform syphilide. The lesion was well infiltrated at its base and around, and in the periphery distinct papules were to be seen. I removed a small portion of skin just outside the border of the main lesion and it presented the same histological features as

the other three cases, except that the endothelial-celled infiltration was more diffuse and here and there arranged in the form of giant cells. Around the giant cells many intra- and extra-cellular parasitic bodies were to be found. All the sections were hardened in absolute alcohol embedded in wax and stained with pyronin and methyl-green. By this method the Leishman-Donovan bodies appear as round or oval cells which contain a big nucleus at one pole, a small nucleus at the other pole and a nucleolus or blepharoplast in the centre. The cell is usually found to be surrounded by a clear space or halo, which I take to be of the same nature as the so-called capsule of capsulated bacilli. This halo is very characteristic of protozoal bodies studied in section, and is, I think, produced by the antagonistic chemico-physical properties exhibited by the parasite on the one hand, and the cells of the host on the other hand. If stained in such a way as to allow the parasitic nuclein to exhibit its affinity for methyl-green, only the blepharoplast stains with pyronin. The blepharoplast which I take to be the nucleolus may be situated anywhere within the cell and sometimes it covers the bigger nucleus. In its centre a highly refractile non-staining dot is usually to be seen which is also always visible in the nucleus when the nucleus and nucleolus appear to be one. The small nucleus I cannot help but think is an abortive male body, because the Leishman-Donovan body itself so closely resembles the female gametocyte of the *Leucocytozoon syphilidis*. The female gametocyte of the syphilitic coccidial protozoon not infrequently is to be found with what I originally considered to be two blepharoplasts. One of these so-called blepharoplasts is discharged from the cell before the cell becomes a gamete, while the other functionates as a nucleolus and becomes discharged as one of the polar bodies after fertilization. I am tempted to hazard the opinion that the expelled blepharoplast is replaced by the male gamete or *Spirochæta pallida*, that the small nucleus of the Leishman-Donovan body corresponds thereto, and that it is not expelled in order to take the place of the male element. The Leishman-Donovan body is next seen in an endothelial cell. Some endothelial cells appear to contain more than one, but as far as I can determine only one fully develops in the cell while the others die and become disintegrated. The pictures in most text-books [3] of so-called mononuclear cells containing several Leishman-Donovan bodies in their protoplasm, I have never been able to verify in section. The host cell is, I believe, always the endothelial cell, and once a parasitic body has found its way therein that characteristic ballooning of the protoplasm of the endothelial cell, with its unstained protoplasm and clear space between its outline and the border of the parasitic body, are never to be missed. The text-book pictures, I believe, depict the bodies lying on but not in the host's cells. The Leishman-Donovan body inside an endothelial cell may not differ from one viewed outside, but more generally the small nucleus will be found to have become part

of the large nucleus, while occasionally the parasitic body will appear to be no more than a streak of nuclein. This last-named body is very deceptive, but working with a very high power (one-eighteenth oil immersion) and with Nicol's prisms I have been able to determine that, except for this streak of nuclein, the rest of the nucleus has been obscured by the bright, highly refractile dot which has increased so much in size as to practically cover the whole nucleus. An increase of nucleolar substance always denotes activity within the cell. Proceeding, the whole cell and especially the nucleus increase in size and the latter divides. Each part of this subdivision divides and subdivides till the cell resembles a spore-cyst. From the stage of the first division of the nucleus to the stage of the complete subdivision, the red pyroninophile body of nucleolus with its highly refractile spot in its centre is to be found in the cell. Sometimes one of the nuclear masses contains a highly refractile unstained dot in its centre. Presumably the function of the nucleolus is to regulate the development of the nucleus. By the time the complete subdivision of the nuclear material has been reached the endothelial cell is no more than an empty case of degenerated material which gives the appearance as if the parasitic cell was extra-cellularly situated. The final stage of the nuclear subdivision never goes so far as is reached by the zygote of the *Leucocytozoon syphilidis* in its spore stage, which rather inclines me to take the view that each of the nuclear masses develops extra-cellularly into a Leishman-Donovan body.

In the several clinical types, although there appears to be no difference in the development of the organism, there is a distinct variation in the size of the intra-cellularly deposited bodies. Whether this accounts for the clinical differences, and whether we are dealing with a similar development of different types of protozoa or not, are problems the future will have to solve.

I have never seen what might be described as a division of a Leishman-Donovan body. The filament or thread which is seen in cultured bodies arising from the smaller nucleus tends, I think, to support my view that this mass of nuclein is of male heritage. Although cultures are instructive, we should not assume that the development of the bodies "in vitro" runs parallel with that "in vivo." From syphilis so far only the spirochætal stage can be cultured, and it has been cultural experiments which have prevented many from regarding as possible that the *Spirochæta pallida* is only the adult male of a coccidial protozoon. The histological pictures are interesting in so far as the structural alterations met with are also encountered in syphilis, tuberculosis, and other granulomata. Clinically the disease is very like syphilis, as in most cases there appears to be a primary lesion which is followed months and years afterwards by other lesions. Furthermore, the recurrent lesions are more ulcerative than the primary lesion, which is likewise the case in syphilis, *vide* gummata.

Finally, from the investigations undertaken I cannot help suggesting that the development described is that of the asexual cycle of a coccidial protozoon. If correct, then the Leishman-Donovan body is the adult or mature form of an asexually reproduced protozoon, in which case the *Leucocytozoon leishmania* would be a suitable name for it. This would give us syphilis as *Coccidiosis venerea* and Leishmaniasis as *C. acenera*.

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ACTINOMYCES ASTEROIDES (EPPINGER) ISOLATED FROM A MADURA FOOT.

By FERDINAND SCHMITTER, M.D.

THE nomenclature of this genus has been quite complicated. A recent work by Merrill and Wade leaves no doubt that *Discomyces* is the correct generic term for these organisms according to the international rules for nomenclature. Breed and Conn also recently reached the same conclusion, but they advocate the use of actinomyces on the ground that a future congress should accept it as a genus conservandum, because the *Actinomyces* of Meyen has ceased to exist as a genus, and it is the earliest term which has no essential contra-indication to its use.

This paper accepts the above and follows Breed and Cohn in the use of the term Actinomyces.

The difficulty of identifying and classifying organisms belonging to the actinomyces is well illustrated by the following list of names which have been applied to members of this genus:—

- Leptothrix oculorum*, Sorokin, 1881.
- Bacterium actinocladothrix*, Afanasiev, 1888.
- Cladothrix asteroides*, Eppinger, 1890.
- Microsporum gracile*, Balzer, 1883.
- Sporotrichum minutissimum*, Saccardo, 1896.
- Microsporoides minutissimus*, Verdun, 1907.
- Micrococcus pelletieri*, Laveran, 1906.
- Indiella somaliensis*, Brumpt, 1906.
- Actinobacillus tuberculi*, Brumpt, 1910.

The so-called tubercle bacillus and other acid-fast branching organisms have been regarded by some writers as actinomyces. This was suggested by Metchnikoff in 1888 and advocated by von Lachner-Sandoval in 1898 and also by Abbott and Gilderleeve in 1902.

Actinomyces asteroides, Eppinger, 1890, the organism with which this paper deals, has run the usual gamut of nomenclature as follows:—

- Cladothrix asteroides*, Eppinger, 1890.
- Streptothrix eppingeri*, Rossi-Doria, 1891.
- Oospora asteroides*, Sauvageau and Raclais, 1892.
- Nocardia asteroides*, R. Blanchard, 1895.
- Discomyces asteroides*, Geddoelst, 1902.
- Actinomyces asteroides*, MacCallum, 1902.

Eppinger's original name, *Cladothrix asteroides*, could not be retained because the organism clearly had true branching as distinguished from the false branching found in the type *Cladothrix dichotoma*, Cohn, 1874.

Eppinger's culture, 1890, the first of this species, was from a brain abscess. MacCallum's culture, 1902, was from a case of peritonitis. Musgrave and Clegg's culture, 1907, called *Discomyces freeri*, was from a madura foot. Lindenburg, 1919, cultivated an organism which Pinoy identifies with Eppinger's organism. While its cultural characteristics correspond, it fails in the important feature of not showing pathogenicity when inoculated intraperitoneally into guinea-pigs.

CULTIVATION OF THE ORGANISM.

The source of the organism was from a madura foot in a woman native of the Island of Cebu. It was cultivated and identified by the writer at Manila in 1914.

Numerous inoculations on the various media were made from the superficial sinuses and deep parts of the madura foot where the surface of the amputated foot had previously been burned, but all, both aerobic and anaerobic, were contaminated with other organisms which soon overran and caused the disappearance of the actinomyces. The principal of these secondary organisms was the Gram-positive diplococcus which on culture grows as a *Staphylococcus aureus* and is very common in tropical pustular conditions. Another attempt was made to isolate the organism by adding graded amounts of formalin to the media but this failed, although it has been successful with other actinomyces.

Four guinea-pigs were inoculated with pus from the lesion. A large and a small one received each an intraperitoneal injection, and another large and a small one received each a subcutaneous injection. The large guinea-pig injected subcutaneously developed sinuses which discharged pus containing the acid-fast organisms. This healed spontaneously in six weeks, when he was killed and no lesions found. The other three guinea-pigs developed peritoneal lesions and died in about three weeks with large caseous masses in the abdomen from which pure cultures were obtained as follows:—

Glycerine Agar.—Growth appears in three days, first as small drab-coloured heaps which gradually increase in size until fusion, in about a week, taking on a pinkish or pale orange tint. In two weeks the growth heaps up several millimetres in height, the mass crinkles and a fine white coating appears on the heaped-up portion. Under a hand lens this coating is seen to be a delicate fuzz. The growth is tough and adherent to the medium.

Sabouraud's Maltose Agar.—After a week 1 mm. elevated drab-coloured colonies are seen, which become 2 mm. in diameter in two weeks when growth stops. The colour does not change.

Dorset's Egg Medium.—A suggestion of growth is apparent on the second day. From then it grows rapidly but does not heap up as much as the glycerine agar culture. In a few days the orange-

pink tint develops, which gradually becomes obscured by a white covering. This covering appears first as a fine velvet, then frosty, and finally chalky. The culture six weeks old is a pure chalky-white with some fine colonies spreading on the glass away from the medium.

Bouillon and Dunham's Peptone Solutions.—Both give growths which appear in a few days as slight flakes on the surface. These sink and a mycelium develops at the bottom of the tube. The medium remains clear at all times.

Litmus Milk.—No acidity or sometimes slightly acid at first, in a week becomes strongly alkaline with floating flakes on the surface, which are pinkish at first, later white. Some of these flakes sinking make a white sediment. After a few weeks it may become thickened and decolorized at the bottom of the tube.

Potato.—The growth is almost a duplicate of that on Dorset's egg medium.

Anaerobic inoculations on both glycerine agar and Sabouraud's maltose agar failed to show any growth for a month when they were allowed air and grew as other cultures.

MICROSCOPIC EXAMINATION.

Gabbet's method showed the organisms acid-fast in smears from the madura foot, inoculated guinea-pigs and cultures. Gram's method showed positive results with similar smears. The acid-fastness disappears after cultivation for some time on media lacking in fatty substances but reappears after inoculation into a guinea-pig.

The organisms as seen in pus and cultures vary in thickness from scarcely visible thin filaments to 1 micron. The branching is monopodial, usually at right-angles and quite irregular. Some filaments terminate in delicate strands, while others become thick and terminate in blunt, club-like ends. They are slightly irregular in thickness, being sometimes granular and sometimes divided into rods like tubercle bacilli. The cultures on glycerine agar and Dorset's egg medium were entirely acid-fast, while that on Sabouraud's was only partially acid-fast. Smears from the cultures on solid media readily broke up the mycelium and did not show the branching as well as those from liquid media. The cultures which had turned white showed very little branching, most of the smears showing fine coccus and bacillus forms, the latter resembling tubercle bacilli.

LITERATURE.

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THE JOURNAL OF

Tropical Medicine and Hygiene

MARCH 15, 1921.

TROPICAL SKIN DISEASES.

It is only some fifty years ago that the serious study of the diseases of the skin and the dermatologists as specialists were recognized as a legitimate department of medicine. Long before then, however, a few names stand out as keen observers and intelligent writers on the cutaneous affections, but the mass of the profession was ignorant to a

degree concerning either the cause or the treatment of the majority of skin diseases. The practitioner had his salves, lotions, dusting powders, baths, ointments and plasters which he tried in succession or at random with the empiricism that characterized well-nigh every department of medicine in the days of our grandfathers. The doctor regarded skin affections and their treatment as a nuisance, for he was ignorant of the terminology in use, of the causes whether "constitutional" or local, and the treatment given in text-books was wholly empirical. The writer felt this keenly when, even in the late 'eighties of the last century he took up general practice in the Far East. He did not even dare to write descriptions of the skin affections he met with, for beyond such terms as dry and weeping eczema, psoriasis, &c., his vocabulary was practically *non est*. Here was a perfect welter of material at hand all going to waste from want of a scientific basis of study to found observations upon. The bitterness of such an experience was a daily reproach to the writer, and must have been to all medical men in the tropics as late as the opening years of the present century. The struggle of such a man as Erasmus Wilson in this country being recognized as a legitimate practitioner because he posed as a dermatologist is within the memory of the older members of the profession to-day, and he was looked upon askance by his medical brethren as a charlatan until he was quite an old man. Special skin hospitals opened here and there in London were tabooed in the seventies and even the eighties of last century, and the fact that certain medical men had their names on the staff of such hospitals brought with it condemnatory remarks upon their status in the profession. It was not until Jonathan Hutchinson allowed his name to appear upon the Blackfriars Skin Diseases Hospital staff that the reproach lost some of its sting, that men began to hold up their heads professionally and dared to style themselves dermatologists. To-day the tale is different; the microscope has in this department of medicine shown its uses and potency more definitely than in any other, and the young practitioner starts with a scientific basis of knowledge on which to found experience and register his experience. To no one are we indebted in tropical medicine more than to Castellani, and in the pages of Castellani's and Chalmers's great work we find a guide on which the tropical practitioner can rely. In Manson's recent text-book on "Tropical Diseases," edited by Manson-Bahr, the tropical skin receives ample attention, and its teaching is thoroughly reliable. MacLeod's lectures at the London School of Tropical Medicine are sending forth to the tropics young men with a sound education in tropical skin diseases and well equipped to observe, to treat, and to write intelligently on this all-important subject. They are no longer afraid to put pen to paper in case their terminology is at fault or the ætiology they suggest is altogether fanciful. From time to time in this journal important and epoch-making observations have been published by Chalmers and by Castellani, and in the present

issue we have the privilege of publishing an article by the late Dr. Chalmers.

Reader, please read, mark and inwardly digest not only the knowledge contained in this article, but, more important still, the method in which the knowledge is set forth. Than Dr. Chalmers we have no superior as to how observation should be conveyed. Take his style and method as your standard to go by. This is the last you will see from his pen, and we advise you to keep it by you always, and set it up before you as the "copybook" heading to imitate as you used to imitate the copybook headings when learning to write at school. As to the ignorance that prevails concerning tropical skin diseases amongst men who have not practised medicine in the tropics the following tale, although a personal one, is not without its uses. One day, in the year 1900, a man presented himself in the writer's consulting room in London. The conversation was as follows: "Good morning; my name is B——." "What can I do for you?"—"I want you to see a skin disease I have." "But I'm not a skin specialist."—"I didn't say you were." "Have you seen any skin specialists?"—"Oh, numbers of them." "Whom did you see last?"—"Dr. Liveing." "It is no use your coming to me after seeing Liveing, he is one of our greatest skin specialists."—"Will you see my skin or not?"—"Well, I'll see it, but not with any pretence to be a specialist; where is your trouble?"—"Between my legs, in my fork." After looking at it, the writer said: "Do you live in England?"—"Yes." "That's curious."—"What's curious about that, some forty millions of people try it." "Well, if you had lived abroad I could tell you, but as you have never been abroad I am afraid I cannot tell you."—"I never said I had lived abroad; but I have travelled abroad." "In the East?"—"Yes, in the tropics." "Where did you notice the skin trouble?"—"In Hong-Kong." "Oh, if you have been there I should call it *dhobie itch*." Pulling up his trousers, the patient remarked: "I know it's *dhobie itch*, but when I have mentioned that to the other men I have seen in London they declared they had never heard of such a disease. Can you cure it?"—"Oh, yes!" "How long will you take to cure it?"—"Three days." "Three days? I have been seeing specialists for six months and tried all the ointments and applications in the British Pharmacopœia, and I'm worse than ever!" "Three days' treatment with the *lotio calceis sulphurata* did cure this man, and the sequence can be imagined. This is all changed now, for this particular and common affection is as familiar to the dermatologists of to-day as is eczema itself.

As an example of the ignorance of the writer in the past (and in common with other tropical practitioners in the nineties) there will be seen on p. 2037 of Castellani and Chalmers's last edition under the heading "*Dermatitis bullosa plantaris*" the following: "Synonym—Foot-tetter (Cantlie)"; and below this: "Definition: *Dermatitis bullosa plantaris* is a streptococcal dermatitis, often secondary to an infection of the soles of the feet caused by *Epider-*

TROPICAL DERMATOMYCOSES.

[See "Manual of Tropical Medicine," Castellani and Chalmers, pp. 2040-2042, edition 1919.]

- | | | |
|--|---|--|
| I. Due to fungi of the genus <i>Epidermophyton</i> Lang, 1879, <i>Trichophyton</i> Malmsten, 1845, <i>Microsporum</i> Gruby, 1843 | <i>Ep. cruris</i> Castellani, 1905, common variety of <i>Tinea cruris</i> (dhobie itch).
<i>Ep. perneti</i> Castellani, 1907, variety of <i>Tinea cruris</i> .
<i>Ep. rubrum</i> Castellani, 1909, variety of <i>Tinea cruris</i> .
<i>T. nodoformans</i> Castellani, 1911, variety of <i>Tinea cruris</i> .
<i>T. macfadyeni</i> Castellani, 1905, variety of <i>Tinea alba</i> .
<i>T. albiscians</i> Nieuwenhuis, 1907, <i>Tinea albigena</i> .
<i>T. blanchardi</i> Castellani, 1905, <i>Tinea sabouraudi</i> tropicalis.
<i>T. ceylonense</i> Castellani, 1908, <i>Tinea nigrocircinata</i> .
<i>T. soudanense</i> Joyeux, 1912
<i>T. violaceum</i> Bodin, 1902
<i>T. violaceum</i> Bodin, 1902, var. <i>decalvans</i> Castellani, 1911
<i>T. currii</i> Chalmers and Marshall, 1914
<i>T. discoides</i> Sahonraud, 1909
<i>T. violaceum</i> Bodin, 1902, var. <i>khartoumense</i> Chalmers and Macdonald, 1915
<i>T. Polygonum</i> Uriburú, 1909
<i>T. exsiccatum</i> Uriburú, 1909
<i>Microsporum flavescens</i> P. Horta, 1912, variety of <i>Tinea capitis</i> and corporis. | Varieties of <i>Tinea capitis</i> . |
| II. Due to fungi of the genus <i>Endodermophyton</i> Castellani, 1909 | <i>En. tropicale</i> Castellani, 1914, <i>Tinea imbricata</i> .
<i>En. indicum</i> Castellani, 1911, <i>Tinea imbricata</i> .
<i>En. castellanii</i> Perry, 1907, <i>Tinea intersecta</i> , 2040. | |
| III. Due to fungi of the genus <i>Malassezia</i> Baillon, 1889 | <i>M. tropica</i> Castellani, 1905, <i>Tinea flava</i> . | |
| IV. Due to fungi of the genus <i>Cladosporium</i> Link, 1809 | <i>C. mansonii</i> Castellani, 1905, <i>Tinea nigra</i> .
<i>C. madagascariense</i> Verdun, 1913, peculiar nodular affection. | |
| V. Due to fungi of the genera <i>Saccharomyces</i> Meyen, 1838, <i>Cryptococcus</i> Kützing, <i>Coccidioides</i> Rixford and Gilchrist, 1897, <i>Monilia</i> Persoon, 1797 | Several species, some of which incompletely investigated | Varieties of blastomycosis |
| VI. Due to fungi of the genus <i>Nocardia sensu lato</i> , Toni and Trevisan, 1889, and <i>Cohnistrepthrix</i> Pinoy 1911 | <i>N. minutissima</i> Burchardt, 1859, erythrasma.
<i>N. carougeauii</i> Brumpt, 1910, juxta-articular nodules.
<i>N. rivieri</i> Verdun, 1912, nodular affection.
<i>C. tenuis</i> Castellani, 1912, trichomycosis axillarum.
<i>C. thibiergei</i> Pinoy and Ravaut, 1909, nodular affection. | |
| VII. Due to fungi of the genera <i>Sporotrichum</i> Link, 1809, <i>Hemispora</i> Vuillemin, 1906, <i>Enantiothamnus</i> Pinoy, 1911, <i>Scopulariopsis</i> Bainier, 1907, <i>Cladosporium</i> Link, 1809, <i>Acremonium</i> Link, 1809, <i>Acladium</i> Link, 1809 | <i>Sporotrichum beurnmanni</i> Matruchot and Ramond, 1905
<i>S. schenki</i> Hektoen and Perkins, 1900
<i>S. asteroides</i> Splendore, 1911
<i>S. indicum</i> Castellani, 1908
<i>Hemispora stellata</i> Vuillemin, 1906
<i>Enantiothamnus brautii</i> Pinoy, 1912
<i>Scopulariopsis blochi</i> Matruchot, 1911
<i>Cladosporium madagascariense</i> Verdun, 1913
<i>Acladium castellanii</i> Pinoy, 1916 | Varieties of sporotrichosis found in the tropics |
| VIII. Due to fungi of the genera <i>Aspergillus</i> Micheli, 1725, <i>Sterigmatocystis</i> Cramer, 1869, <i>Madurella</i> Brumpt, 1905, <i>Indiella</i> Brumpt, 1906, <i>Nocardia</i> Toni and Trevisan, 1889, <i>Cohnistrepthrix</i> Pinoy 1911, <i>Sporotrichum</i> Link, 1806, <i>Monosporium</i> Bonorden and Saccardo, 1898, <i>Glenospora</i> Berkeley and Curtis 1876 | <i>Aspergillus bouffardi</i> Brumpt, 1906
<i>Sterigmatocystis nidulans</i> Eidam, 1883
<i>Madurella mycetomi</i> Laveran, 1902
<i>M. borei</i> Brumpt, 1910
<i>M. tozeuri</i> Nicolle and Pinoy, 1906
<i>Indiella mansonii</i> Brumpt, 1906
<i>I. reynieri</i> Brumpt, 1906
<i>I. somaliensis</i> Brumpt, 1906
<i>Nocardia modurei</i> Vincent, 1894
<i>N. asteroides</i> Eppinger, 1890
<i>N. pelletieri</i> Laveran, 1906
<i>N. bovis</i> Harz, 1877
<i>C. israeli</i> Kruse, 1896
<i>Sporotrichum beurnmanni</i> Matruchot and Ramond, 1905.
<i>Monosporium apiospermum</i> Saccardo, 1911
<i>Glenospora khartoumensis</i> Chalmers and Archibald, 1916
<i>G. semoni</i> Chalmers and Archibald, 1917 | Various types of gummatus affections. |
| IX. Due to fungi of the genera <i>Aspergillus</i> Micheli, 1727, <i>Penicillium</i> Link, 1809 | <i>A. barbae</i> Castellani, 1907, Aspergillosis of hairy parts.
<i>P. barbae</i> Castellani, 1907, Penicilliosis of hairy parts. | |
| X. Due to fungi of the genera | <i>Aspergillus</i> Micheli, 1725
<i>Penicillium</i> Link, 1809
<i>Monilia</i> Persoon, 1791
<i>Montogella</i> Castellani, 1907 | Pinta. |
| XI. Due to fungi of the genus <i>Trichosporum</i> Behrend, 1890 | <i>T. giganteum</i> Behrend, pidra.
Species as yet not well determined | Tropical varieties of nodular trichomycosis. |
| XII. Due to fungi of the genus <i>Pityrosporum</i> Sabouraud, 1903 | <i>Pityrosporum canthii</i> Castellani, 1907, variety of tropical seborrhœa. | |

mophyton cruris Castellani." This confession of ignorance is exemplified by the wording "foot-tetter," given by the writer; he had pricked numerous bullæ of this disease, stained the contents, found streptococci, but did not possess sufficient "valour of ignorance" to mention the fact, being untrained in the terminology of skin ailments.

Many, many men have found themselves in the position of the writer. We had no text-book then to guide us, for Manson's text-book did not appear until years afterwards, and the writings of men in the tropics before then on skin ailments were for the most part of little scientific value. Training in our School of Tropical Medicine, text-books on tropical diseases, journals of tropical medicine, and one is proud to remember that this Journal (THE JOURNAL OF TROPICAL MEDICINE, established in 1899) was the pioneer, and many local publications in our Crown Colonies, have altered all this, and the practitioner in the most remote island of the Pacific is placed in a position to be able to record with confidence his clinical observations with exactitude and in such a form as to command the attention of all tropical men in the forefront of scientific research.

Without discussing the matter dealt with in the valuable articles on skin affections set forth in the present number of this Journal, which we will refer to in a future issue, we cannot do better than reprint from Castellani and Chalmers:—

"Tropical dermatomycoses—that is to say, tropical skin diseases caused by fungi higher than bacteria—may be classified as shown in the table.

"It will be seen that tropical dermatomycoses *sensu stricto*—viz., occurring only in the tropics—are comparatively few. Most of them are endemic also in temperate zones, though occurring there rarely, or at any rate less frequently than in the tropics. We may mention as examples tinea cruris and Madura foot. The same remark, however, applies to every other branch of tropical medicine.

"The frequency of dermatomycoses in the tropics is probably due to the hot, damp climate being very favourable to the growth of vegetal parasites."

J. CASTLIE.

Annotations.

Condylomata Acuminata (A. N. Creadick, M.D., *Journal of the American Medical Association*, vol. lxxv, No. 16, 1920).—Condylomas of two kinds may develop about the vulva, namely, condylomata lata and condylomata acuminata. The former, which have a broad base, are an accepted manifestation of syphilis, while as yet the aetiology of the latter has not yet been clearly defined. Small, discrete, pointed papillæ at first, condylomata acuminata become confluent and form growths of considerable size, especially during pregnancy. Ordinarily they are ascribed to a persistent irritating discharge, the result of gonorrhœa, but it is now admitted that they may have an independent origin.

As regards treatment of condylomata acuminata,

the topical application of ointments and escharotics produces either a slow effect or none at all. Removal by the cautery, also, is likely to be followed by recurrence. Surgical excision offers the most efficient method of treatment. The larger growths may be amputated at the point of attachment of the pedicle, and the raw areas closed with cutaneous sutures; the smaller growths may readily be shaved off with a scalpel held at an appropriate angle. After removal of the smaller papillomas, bleeding is usually controlled by pressure; if not, the thermocautery will be effective.

Röntgen Rays or Radium combined with Excision in the Treatment of Keloids (G. E. Pfahler, *Arch. of Derm. and Syph.* vol. ii, No. 2, 1920).—The writer recommends that keloids should be treated by X-rays or radium as soon as they are recognized. The best results will generally be obtained, however, by combining radiotherapy with excision, applying radiotherapy both before and after excision.

Infectious Eczematoid Dermatitis (R. L. Sutton, M.D., *Journal of the American Medical Association*, vol. lxxv, No. 15, October, 1920).—This condition, "staphylogenic (?) eczematoid dermatitis" of Engman, which often develops after scabies, furunculosis and other suppurative affections, is thus characterized:—

(1) The initial or earliest lesion may be a vesicle, pustule or erythematous, scaly or crusted point or plaque.

(2) The vesicles are not so closely placed and are larger than those seen in an acute symmetrical vesicular eczema.

(3) There is no symmetry in the arrangement of the lesions, except when thus accidentally inoculated.

(4) It occurs in patches, usually not involving a large area of surface in a single patch. When the disease begins as vesicles, they soon break to form a scaly patch which extends in the usual manner. New foci may begin as a cluster of vesicles.

(5) The patches are circumscribed with sharply defined borders. The epidermis at the periphery is usually undermined, split up, detached or raised, the two latter events being caused by perceptible or imperceptible serous or seropurulent fluid, which may, if it contains much fibrinous material, instantly form a thin ridge-like crust about the periphery; while if in larger amounts and more fluid drops of it can be pressed out from under the raised epidermis.

(6) The disease increases by peripheral extension of the patches and the formation of new ones by auto-inoculation.

(7) The exposed parts are the most frequently affected.

(8) There is no attempt at central involution.

(9) There is a minimum amount of itching.

(10) The nearest lymphatic glands are often enlarged.

(11) The initial and earliest vesicle, pustule, scaly or crusted spot contains the yellow or white staphy-

lococcus in pure culture, as well as the surface and crusts of the later patches.

(12) Experimental auto-inoculation can usually be successfully performed, but the lesion thus produced begins as an erythematous patch which soon weeps and crusts, and not as vesicles.

(13) The history of trauma, infection or association with suppurative conditions is characteristic of the affection.

(14) Local antiparasitic applications are sufficient to effect a cure.

While infectious eezematoid dermatitis is in no sense of the term a purely anaphylactic manifestation, in many cases there is a concurrent eruptive phenomenon which can be ascribed to no other source than that of allergy. The association of the two conditions is too frequent to be due to accident alone. In a series of seventy-four case histories, selected at random and scattered over a period of two years, the author found a record of concurrent urticarial eruptions in nineteen instances (more than 25 per cent.). The antecedent disorders varied greatly, but were fairly characteristic: lacerated, infected wound of the hand; furuncle of the right thigh; scabies; infected in-growing toe-nail; ecthyma; infected wound of the right fore-finger; otitis media; infected, incised wound of the right hand; infectious discharge of the nose; infected wound of the right shin; furuncle of the left axilla; paronychia; infected wound of the thumb, and furuncle of the scalp. As a rule the anaphylactic manifestations did not appear until after the staphylococcal disorder was well under way. A considerable percentage of these patients had never before suffered from urticaria. In a few instances the wheals were accompanied by vesiculation, with subsequent infection and pustulation. As a rule the pustules did not heal promptly.

All of the attacks were non-febrile. As a rule the earlier lesions were frankly suppurative (of fourteen cases in which cultures were made, *Staphylococcus aureus* was recovered in eleven) and auto-inoculable. In the latter, more generalized eruptions, however, attempted cultivation frequently proved unsuccessful.

In the post-scabetic cases, the dermatitis, which commonly started in the axillary or the genital regions, might at first resemble a rash due to drug irritation (sulphur), but the manner in which new lesions quickly developed on the face and other parts of the body, precluded a probable diagnosis of dermatitis medicamentosa.

The eruption was usually roughly symmetrical and involved areas which had never received local treatment of any kind. The urticarial manifestations may persist for several weeks after the early suppurative lesions have healed.

As regards treatment in the early stages of the disease, a mild astringent, such as an aqueous solution of aluminum acetate (9.5 per cent.), or even lead and opium lotion (lotio opii et plumbi subacetatis) is more effective than one of the greasy preparations. At the end of forty-eight or seventy-two

hours, however, one may profitably begin the use of a weak ammoniated mercury ointment (2 per cent.), together with a bland dusting powder containing a small amount of boric acid. After the tendency to suppuration has been overcome, phenolated zinc oil may be substituted for the mercurial ointment.

For the relief of the pruritus which often accompanies the urticarial lesions, calamine lotion, to which liquor carbonis detergens (from 2 to 10 per cent.) has been added, affords much relief. If necessary, a small amount of phenol (1 per cent.) or menthol (0.5 per cent.), may be added to ammoniated mercurial preparation, and the ointment used in conjunction with the lotion.

In many instances, unfortunately, local treatment fails to bring about a cure, at any rate within a reasonable length of time. Internal alkaline preparations, such as sodium acetate and sodium citrate (as recommended by Skillern in combating furunculosis), in large doses, combined, if the patient is nervous and irritable, with sodium bromide, frequently prove helpful. If these, too, fail, the author has found the most serviceable remedy to be a mixed staphylococcus vaccine. The initial dose should be small (25,000,000 to 75,000,000), and the injections should be repeated every third day, gradually increasing the amount each time.

Treatment of Lupus Vulgaris by the Liquid Acid Nitrate of Mercury (H. G. Adamson, M.D., F.R.C.P., *Brit. Med. Journ.*, p. 123).—Recently the writer has found the liquid acid nitrate of mercury a remedy of the selective caustic type which far surpasses any other in efficacy and rapidity of action. It has long been known as a potent remedy for certain tertiary syphilitic sore and fungating syphilitic granulomata, but it seems to have been seldom used in lupus. The cases which the writer has treated may be arranged in four classes:—

(1) Old cases of lupus which have been treated by other methods, but in which lupus nodules still remain in the scars.

(2) Single patches of non-ulcerated lupus of the size of a shilling to that of half-a-crown, which have received no previous treatment.

(3) Ulcerated lupus, often of large extent and with much surrounding inflammatory infiltration.

(4) The common type of lupus of the nose, involving frequently also the nasal septum, palate, upper lip, cheek, and sometimes the lacrymal sac and skin over and around—a type difficult to deal with by Finsen light or by scraping.

The liquid acid nitrate of mercury is applied by means of a swab of wool tightly twisted round the ends of a finely-pointed pair of forceps. It is painted on to the affected areas freely and with firm pressure for one or two minutes, taking care to limit the application exactly to the lupus patches, to isolated nodules, or to ulcerated surfaces. In the case of isolated nodules or non-ulcerated lupus

patches the semi-translucent reddish-brown "apple jelly" lupus tissue after a minute or so takes a dry yellowish-white opaque appearance. No dressing is applied and the patient is seen again in a week. The yellowish-white opaque appearance has then given place to a thin brownish crust, which falls in a few days and leaves the affected area sometimes completely healed, sometimes as a shallow ulcer which heals in a few days. In many instances a single application has been sufficient to replace the lupus by a smooth healthy scar without any remaining lupus nodules. In other cases isolated nodules have remained in the scar and it has been necessary to repeat the application one or more times. The application is only slightly painful at the time, but it is followed by more severe pain for several hours.

In ulcerated lupus, after removing the crusts, the solution is freely painted on to the ulcerated surface. This causes considerable pain, but if a not too large area be done at one sitting it is easily borne by most patients. The surface of the ulcer becomes dry yellowish-white, but in a few days much serous exudation gives rise to a thick heaping-up of crust. At the end of a week the crusts are picked off or bathed off, and there is then an ulceration with purulent surface, and a margin of pink healthy epidermis which heals in the course of a week or two.

The Production in Monkeys of Symptoms closely resembling those of Pellagra by Prolonged Feeding on a Diet of Low Protein Content (Harriet Chick and E. M. Hume, *Biochemical Journal*, vol. xiv, No. 2, April, 1920).—A large amount of food factors were supplied, as butter, marmite and orange juice, while the main diet consisted of sugar, cornflour, salt and corn gluten. A small daily ration of apple or banana was given as a relish. The corn gluten was almost the sole source of protein.

Varying amounts of the above substances were given in three different diets. Diet 1 = total protein 23 gm.; total protein other than zein 7.3 gm. Diet 2 = total protein 15 gm.; total protein other than zein 5 gm. Diet 3 = total protein 8.2 gm.; total protein other than zein 2.9 gm.

Three monkeys of the species *Macacus rhesus* were chosen. One of them, on Diet 3, developed skin symptoms closely resembling those of pellagra in the human subject both in symmetry and in behaviour in sunlight. Attempts at cure were made with (1) tryptophan, (2) a mixture of lysine, arginine and histidine, and (3) caseinogen, which brought about a complete disappearance of the eruption.

The Effect of shaking Alkalinized Aqueous Solutions of Arsphenamine and Aqueous Solutions of Neoarsphenamine in the Presence of Air (George B. Roth, Pharmacologist, Hygienic Laboratory, United States Public Health Service, *Public Health*

Reports, vol. xxxv, No. 38, September 17, 1920).—Shaking alkalinized aqueous solutions of arsphenamine or aqueous solutions of neoarsphenamine in the presence of air renders them highly toxic, as shown by intravenous administration to white rats. The increase in toxicity caused by such shaking is presumably due to the oxidation of these compounds to p-oxy-phenylarsenoxide, commonly called "arsenoxide," inasmuch as shaking a solution of neoarsphenamine in the absence of air does not increase the toxicity of such a solution. The author comes to the conclusion that the toxicity of alkalinized aqueous solutions of arsphenamine or aqueous solutions of neoarsphenamine is greatly influenced by the manner in which they are prepared for administration.

A Case of Lindenberg's Mycetoma (De Souza Araujo, *Arch. Brasileiros*, vol. vii, No. 2, February, 1917).—The author describes a case of mycetoma, which he identifies with the variety described in 1909 by Lindenberg caused by a fungus which he called *Discomyces brasiliensis*. This type belongs to and is regarded by Araujo to be incurable, the Oehroid group of mycetoma of Castellani and Chalmers.

On the Aetiology of Alopecia Areata (R. Sabouraud, *Ann. de Derm et de Syph.*, 1920, pp. 177-192).—The author reviews all the current theories of the origin of alopecia areata—the parasitic, the neurotrophic, the reflex irritation theory of Jacquet—and dismisses them all with reasons that seem quite convincing. He points out that the disease appears in certain well-defined categories. In some families it is hereditary, it occurs not infrequently in connection with vitiligo and exophthalmic goitre. It is common in women at or about the menopause. Apart from these cases the author is inclined to think after a long clinical and experimental study of the disease that a large number of cases, at least in childhood and adolescence, are due to syphilis inherited in a larval form, and considers that a mercurial treatment is very useful.

Erythema nodosum: its Treatment by Streptococcus Vaccine (Sandor A. Levinsohn, M.D., *Medical Record*, November, 1920).—According to the author, *Erythema nodosum* is a chronic, low-grade infection, secondary to a primary focus elsewhere. This primary focus is not always demonstrable, as it may have disappeared at the time the patient appears for treatment. It is generally considered necessary to remove all possible foci of infection, but this is a difficult task, as the teeth and tonsils, &c., have to be removed, and often the result is unsuccessful. For this reason streptococcus vaccine was used with the hope of an efficacious action, because of the chronicity and low grade of the infection.

The specificity of the streptococcus for this lesion

is suggested because of the local hyper-reaction resulting from the treatment, and the production of nodules at the site of the injections. In the author's case the vaccine treatment of *Erythema nodosum* gave a gratifying result.

Abstracts and Reprints.

A CASE OF CASTELLANI'S ACLADIOSIS.¹

By R. W. MENDELSON, M.D.
Acting M.O.H., Bangkok, Siam.

ON June 8, 1920, a Chinese coolie, working in a local rice mill, entered the out-patient clinic of the Central Hospital.

Clinical History.—About four months ago he first noticed a small red spot below the left knee; there was a very slight amount of itching but no pain, and within a month this spot had increased in size and developed into an ulcer. Several other spots



appeared within the neighbourhood of the first one and passed through the same stages. At no time was there much discomfort, and only a very slight amount of itching. Upon close examination, lesions that very closely resembled yaws were observed on the left leg, as shown in the illustration. They were covered with a thin yellow scab, which revealed upon removal a collection of thick creamy pus. After thorough cleansing the lesions presented, instead of the mulberry appearance of yaws, a sharp depression of a red granulating tissue. The borders of these ulcers were clearly defined, with a rounded surface of normal tissue. There was no gland involvement whatever, and the rest of the body was free from any skin trouble. The blood examination was negative, except for a slight leucocytosis. The urine examination was negative. The physical examination except for the skin trouble was also negative.

Bacteriological Examination.—Various media were inoculated from scrapings of the sores. On carrot and potato a creamy abundant growth developed, which turned darker in the course of a few days. On glucose agar the growth was also abundant. Microscopical examination of the growth showed the presence of fungus growing in symbiosis with a coccus, which could with difficulty be separated from it. The fungus had all the morphological and cultural characters of *Acladium castellanii* (Penoy, 1916). The detailed botanical account of it with drawings, photomicrographs, &c., will be given in a future publication.

Large doses of mixed iodides and daily dressings at the clinic produced rapid and satisfactory results.

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CAMEL ITCH.¹

By WILLIAM DYSON, O.B.E., M.D.

IN November, 1917, I was ordered from Egypt to Palestine to report on an epidemic of skin disease which had broken out among the *personnel* of the Camel Corps. I found the men suffering from a papular, intensely irritative dermatitis, of which the following are the chief characteristics: The individual lesions are situated at the entrance of the hair-follicles. There are no burrows to be seen. The lesions are similar in appearance to those caused by the harvest bug.

Distribution.—The disease is localized chiefly on the arms, secondarily on the legs and chest; in severe cases the whole body is involved. Secondary pyogenic infection is present in many cases, the result of scratching.

It is to be noted that the parts attacked were those in which the skin came in contact with the camels, or on which the scales alighted in the act of grooming. A light band, such as a belt, sharply limited the spread of the disease.

Symptoms.—Intense itching, especially when the patient becomes warm at night; this irritation was so severe in some cases as to prevent the sufferer from sleeping. The camels of this unit were badly affected with the mange.

Method of Investigation.—Specimens of the skin were obtained by snipping off individual papules with a pair of curved scissors, and after prolonged soaking in liquor potassæ were examined under a microscope. Scrapings from the skin were examined in a similar manner, and also scrapings from the skin of camels suffering from mange.

¹ Reprinted from *British Medical Journal*.

¹ Abstracted from *British Journal of Dermatology and Syphilis*, vol. xxxiii, No 3, March, 1921.

Ætiology.—(1) The disease is caused by a parasite similar to, but smaller than the *Acarus scabiei*.

(2) The parasite enters the human skin by burrowing down a hair follicle. I have been able to demonstrate the female acarus in the human skin lying at the root of a hair-follicle.

(3) In two cases Dr. Craig, of No. 2 Military Laboratory, has found a lemon-coloured ovum in scrapings from the human skin. In other cases our search for ovum was negative.

(4) I have not succeeded in finding the male acarus either on or in the human skin.

(5) In scrapings from camels suffering from mange the acari, male and female, are easily found.

Treatment.—The camel acarus does not propagate its kind on the human species but dies after entering the skin, therefore all that is required in the way of treatment is to avoid contact with mangy camels and some antipruritic remedy to allay itching. I found an evaporating lotion containing carbolic acid quite satisfactory.

ANTIMONY IN LEPROSY.¹

By F. G. CAWSTON, M.D.

IN view of the remarkable improvement that was shown in some leper patients whilst undergoing a series of intramuscular injections with Oppenheimer's colloidal preparation of antimony (oscol stibium) in March of this year, I decided to give the treatment a further trial.

Two lepers were admitted to the depot hospital of the Indian Immigration Board on August 23.

Sital stated that he had suffered from the condition for four years, during which time he had lived at Weenen, in Natal. The fingers were stiff and the extremities covered with a blood-stained discharge. All the fingers and both thumbs were discharging, and he had lost the nail of one finger of the right and two fingers of the left hand. All the toes were discharging, and only the small stump of one of the toes remained on the right foot. The face was free from signs of leprosy.

Oscol stibium 2·5 c.c. was injected into the right deltoid muscle on August 23, 4 c.c. on the 24th, and 5 c.c. on the 25th and 26th. As there was some diarrhoea on August 27 and 28, the injections were discontinued until August 30, when 4 c.c. were given without ill-effect.

On August 31 the patient was feeling very well and all the ulcers were dry. No further treatment was given. On September 20 the extremities were still free from discharge, and all the stiffness had gone from the patient's hands, which he is able to use freely.

I asked Dr. J. Mackay, who has had an extensive experience of leprosy, to see this case, and he was

agreeably surprised to see how effective the treatment had been. In his opinion there was no doubt whatever that the departmental medical officers had diagnosed the condition correctly as advanced leprosy. The case has also been under observation by Dr. Kerr Cross and Dr. G. L. Bonnar, the Indian Medical Officers of Durban.

On October 18 a swab was taken from the nasal secretion, as no discharge was available, and submitted to Dr. W. A. Murray, the Government pathologist at Durban, who reported the entire absence of *Bacillus lepræ*.

Naukaklia was admitted to the Indian Immigration Hospital on August 19 in a very advanced stage of the disease. She was very frail, and not expected to live long. The hair was badly infested with nits. She was very emaciated, and her fingers and hands badly ulcerated. She had lost one digit of the right thumb, two digits of the right index finger, and the top digit of the middle finger of the left hand. The toes were not affected. The whole of the back of the right hand was covered with an extensive discharging scab, possibly the result of a burn. The discharge on several of the fingers was bloodstained. In several places bare bone was showing on the extremity of the fingers.

Oscol stibium 2·5 c.c. was injected intramuscularly on August 23, 3·5 c.c. on August 24 and 4 c.c. on August 25. This caused diarrhoea for several days and the injections were discontinued.

On August 29 the ulcers were nearly dry, and on September 2, when I asked Dr. Kerr Cross to see the case, the ulcer on the back of the right hand was covered with a fairly clean scab showing evidence of rapid healing. On September 6, though bare bone was still protruding through the ulcers on the extremities, all the ulcers were dry, and the scab on the right hand had come away, leaving a healthy, dry skin.

On September 20 the extremity of one finger showed slight discharge and another ulcer on the hand looked unhealthy, so oscol stibium 2 c.c. was injected intramuscularly. All the other ulcers were remaining dry, the condition of the scalp was much better, and all trace of diarrhoea had gone, though the woman was remarkably frail, somewhat hysterical, and took little food.

On September 23, as one little finger-tip was again moist with discharge, oscol stibium 3 c.c. was injected intramuscularly. Since then no further injections have been given, for all the ulcers have remained dry. The patient is still very weak, and not expected to live much longer, but all signs of active leprosy conditions have disappeared.

In commenting on these two leper patients, Dr. G. L. Bonnar, the acting medical officer, Durban Indian Circle, states:—

"On admission both were showing active signs of the disease, with numerous ulcers on the fingers and toes. Although no further treatment has now been given for over a month there has been no recurrence of the signs of leprosy, and the ulcers have completely dried up."

¹ Abstracted from the *British Medical Journal*, No. 3,127, December, 1920.

AN EXPERIMENTAL STUDY OF THE LATENT SYPHILITIC AS A CARRIER.¹

By FREDERICK EBERSON, Ph.D., and MARTIN E. ENGMAN, M.D.

Technique.—Healthy, full-grown male rabbits, with well-developed testes, were used in the inoculation experiments. Fluid materials, such as the blood, semen, spinal fluid and nasal washings, were injected in amounts of 1.2 to 2 c.c. Glands and testes were first macerated with sterile quartz sand suspended in 5 c.c. of salt solution, filtered through gauze and injected similarly into the rabbits' testes by inoculation along the long axis and expelling the material as the needle was being withdrawn slowly from the body of the testes.

Inoculated rabbits were examined carefully at frequent intervals within three weeks after injection. Dark field examinations of the testicular fluid material were made at least every two weeks, even when no visible changes occurred, in order to safeguard against missing minute lesions within the body of the testes. Punctures were made with sterile glass pipettes drawn out and broken off at the end so as to leave a sharp cutting edge. By means of gentle pressure and a slight boring motion, laceration was avoided. Observations were continued over a period of eight months, and in many instances a year. Animals that have remained negative to date are still under observation.

Infectivity of Lymphatic Glands from Latent Syphilites.—Fourteen inguinal glands from as many patients were inoculated into rabbits' testes. Of this entire series of rabbits, three died within three months after inoculation, showing no signs of infection. Positive results were obtained with glands from three patients, two females and one male.

Infectivity of Semen from Latent Syphilites.—Seventeen specimens of semen from different patients were inoculated. In this series, four rabbits died within one month and two within three months after injection, showing no signs of syphilis. Semen was found to contain active virulent spirochaetes in two instances. The blood from these patients was injected into rabbits with negative findings.

Infectivity of Blood from Latent Syphilites.—A total of seventy-three specimens have been examined with negative results. A series of thirty-six specimens defibrinated as well as clotted, duplicating a number of the entire group, was incubated for a period of from three to four months. Inoculations with these bloods resulted negatively.

Infectivity of Spinal Fluid from Latent Syphilites.—Thirty-one specimens of spinal fluid were injected into rabbits' testes, with entirely negative results. The fluids showed lymphocytosis in ten cases with a negative Wassermann reaction in all but one instance. The corresponding blood Wassermann reactions were positive in all but two instances, and in these the cell count was less than eight.

Infectivity of Nasal Washings from Latent

Syphilites.—Twenty-four specimens of nasal washings were injected and resulted negatively.

SUMMARY AND CONCLUSIONS.

In this study *Spirochaeta pallida* has been isolated in five instances from latent syphilites—three times from inguinal glands (in two women and one man) and twice from the semen. The strains produced typical syphilitic lesions in rabbits' testicles and could be recovered and propagated for an indefinite number of generations. The incubation periods of the spirochaetes isolated from the glands were respectively fifty, fifty-four, and 133 days, the last being doubtful owing to an early secondary infection in the experimental animal. The two strains that were isolated from the semen developed after four and seven months respectively.

S. pallida was isolated from patients who gave a history of syphilis dating back eleven and thirteen years in two instances, and one year in three instances. An inguinal gland and the semen proved positive for spirochaetes in the two cases first mentioned and the glands and semen in the last named. In this series of positive results a gland was found to be infectious in the case of a man whose Wassermann reaction had been negative, following treatment, and at the time of taking the specimen for the experiment gave a reaction only in the cholesterin antigen. A second instance of this nature was found in the case of a specimen of semen which proved positive for *S. pallida*.

As far as studies with these different strains have progressed there is no indication that *S. pallida* has lost in virulence for the rabbit. Detailed experiments on infectivity and other phases of experimental syphilis with these and other strains will be reported subsequently.

It appears from this investigation, and that of others, that the blood and other body fluids, excepting semen, are not infectious in latent syphilis, or if so, but rarely.

These investigations demonstrate the fact that those persons that give a history of an old syphilitic infection may harbour active virulent *S. pallida* for years, and this in the face of irregular negative Wassermann reactions or slight reactions only in the cholesterin antigen.

Medical News.

Leprosy Notifiable in Brazil.—The National Board of Health has made the notification of leprosy compulsory and also the report of the change of residence or the death of one known or suspected to have leprosy.

Rapid Treatment of Impetigo by Potassium Permanganate.—Remarkable results have been obtained by Dr. D. Sicilia from washing the impetiginous lesions with a strong solution of permanganate of potash (from 1 to 5 per cent.) followed by the application of a solution containing methylene blue.

Original Communications.

TROPICAL AND EXTRA-TROPICAL EDIBLE FRUITS OF THE FAR EAST.

By CHARLES FORD, Esq., I.S.O., F.L.S.

Formerly Superintendent of Botanical and Afforestation Department, Hong-Kong.

MALAYAN REGION.

BREAD-FRUIT, *Artocarpus incisa*.—A tree about 40 ft. high. Leaves about 18 in. long, large, rough, dark green, divided into lobes. Fruit roundish, about 9 in. long, marked with hexagonal knobs. Pulp of the interior white, partly farinaceous. It is roasted before it is eaten.

Custard-apple, bullock's heart, *Anona reticulata*.—A smallish, slender tree or shrub. Fruit in shape resembling a heart, scaly, containing a soft, white pulp, and having a combined flavour of sweet and acid.

Durion, *Durio zibethinus*.—A forest tree attaining 60 ft. in height. Leaves entire and oblong, with a silvery appearance. Fruit oval or globular, up to 10 in. in length, with a thick, hard rind covered with strong, sharp prickles, divided into five cells containing seeds about the size of pigeons' eggs and a cream-coloured pulp. The pulp is delicious to those who are accustomed to it and it is easy to digest. The odour is revolting.

Mangosteen, *Garcinia Mangostana*.—A moderate-sized tree. Leaves leathery, smooth, shining, elliptical-oblong and pointed. Fruit spherical, the size of a small orange, reddish-brown when ripe, the rind about $\frac{1}{2}$ in. thick. It contains a juicy pulp of snowy whiteness, is very soluble, and of a delicious flavour.

Mango, *Mangifera indica*.—A rather large, densely headed tree. Leaves 8 in. long, lanceolate and shining. Fruit oblong, up to about 5 in. in length, bright yellow when ripe; the rind is thinnish and is easily peeled off the delicious yellow pulp which adheres to a large, flat, stony seed vessel.

Rambutan, *Nephelium lappaceum*.—A small tree. Leaves with five to seven pairs of leaflets. Fruit bright red, about 2 in. long, oval, slightly flattened, and covered with long, soft, fleshy spines, and containing an acidulated pulp with a large seed in the middle. The rind is thin and firm.

Rose-apple, *Eugenia malaccensis*.—A tree about 20 ft. high. Young leaves bright purple, afterwards green and firm. Fruit varying from 1 in. to 3 in. or 4 in. in diameter, with a fleshy, firm and rather brittle rind, skin yellowish, shining and thin; it contains one or two large seeds, and has an agreeable rosy smell and taste.

MALAYAN REGION AND CHINA.

Banana, *Musa sapientum* and *M. Cavendishii*.—This and the plantain are often confused. The stem of the dwarf kind, *M. Cavendishii*, grows up to about 5 ft. high, and with *M. sapientum*, which

is of taller stature, has its stem marked with purple spots. The plantain has a longer stem and longer and thicker fruit, which is generally cooked, while that of the banana is eaten, when ripe, raw.

Carambola, *Averrhoa Carambola*.—A small tree. Leaves pinnated with five to eleven lobes. Fruit about 3 in. long, green and shining with five prominent angles running lengthwise; a transverse section looks like a star with five rays. It has an acid taste.

Guava, *Psidium Guyava*.—A small tree. Fruit roundish, 2 in. in diameter, bright yellow when ripe, very strongly scented, filled with a yellowish pulpy flesh with a pleasant acid-sweet flavour.

Papaya, *Carica Papaya*.—A tree with a single, unbranched stem about 15 ft. high, composed of soft spongy wood. Leaves up to 2 ft. in diameter, deeply cut into seven broad lobes; their footstalks about 2 ft. in length and diverging nearly horizontally from the stem; they are situated bunched together near the top of the stem. Fruit oblong, about 10 in. long and 5 in. broad, orange-yellow skin, rind yellow, thick and fleshy like a melon in appearance; the taste is sweet and pleasant.

Pine-apple, *Ananassa sativa*.—No description is needed of this well-known fruit.

Pomegranate, *Punica Granatum*.—A small tree up to 15 ft. in height with slender branches and small leaves. There is a dwarf variety, which seems to be the one cultivated in China. Fruit red, about 3 in. in diameter, with a hard, leathery skin or rind, and crowned with the persistent tube of the calyx. The pulp is a sweet-acid flavour and very full of seeds.

Sweet-sop, *Anona squamosa*.—A very small, weak-stemmed tree or shrub. Leaves have a disagreeable odour. Fruit up to about 3 in. or 4 in. in diameter of a greenish-yellow colour and covered with projecting scales, which are rather thick, and it easily disintegrates, when ripe, at the junction of the scales. It is full of a luscious, sweet soluble pulp, in which are embedded numerous hard blackish seeds. In China this is often wrongly called custard-apple.

Whampee, *Clausena Whampi*.—A small tree. Fruit about the size and shape of a grape, yellow-skinned and borne in pendent clusters, nearly filled with two to four large green seeds; the juice which surrounds them is somewhat tart and much esteemed. It belongs to the same natural order, *Aurantaceae*, as the orange. Its native country is unknown.

CHINA.

Citron, *Citrus Medica*.—The finger-orange or finger-citron of China comes under this species, of which it is a variety, with finger-like divisions at the end of the fruit; it is chiefly used for ornament.

Date, jujube, *Ziziphus Jujuba*.—A small tree or stiff shrub with more or less spiny branches. Fruit eaten both in fresh and dried state; they are the jujubes of shops, rather acid when fresh; the fruit is fleshy berry-like, with one- to three-celled stone.

This Chinese-date is in no way related to the true date.

Kum-qwat, *Citrus aurantium*, variety.—A small tree like an orange tree, of which it is a variety. Fruit about the size of a large grape, orange-like. It is preserved in syrup like Chinese ginger, and is much esteemed as a desert fruit.

Li-chi, *Nephelium Litchi*.—A handsome tree, 20 ft. or more in height, with a short trunk and wide-spreading branches. Leaves dark-green and glossy. Fruit borne in loose clusters, rind red, rough, thin and brittle; the interior is filled with a translucent, jelly-like, watery and sweet pulp. There are several varieties. The largest fruit is nearly 2 in. in diameter, and contains one large seed. The best variety, the hak-yip, is a little smaller and has not such large seeds; such as there are are also very frequently abortive and represented by only a small substance. The dried fruit of the shops does not afford any likeness to the luscious fresh fruit.

Loquat, *Eriobotrya japonica*.—A moderate-sized tree. Leaves large, broad-lanceolate, with prominent veins. Fruit oval, pale-orange, tinted with pink, nearly 2 in. in diameter, with a rather acid, apple-like flavour. Flowers very fragrant.

Lung-ngan, *Nephelium Longana*.—A tree in size resembling the li-chi, but with duller foliage. Fruit borne on long stalks in loose bunches, it is smaller than that of the li-chi, and has a smooth, yellowish-green brittle rind; it contains a large seed and but little substance surrounding it, of a different flavour to the li-chi, but rather pleasant.

Olive, *Canarium Pimela*.—A small tree of very stiff habit and very light-coloured bark. Fruit a triangular drupe with one cavity—one only by abortion—containing one seed. Another very large tree, *Dracontomelum mangiferum*, produces a similar fruit, which it is reported is used in a similar manner. This China-olive is not at all related to the European olive.

Orange, *Citrus aurantium*.—The ordinary orange with its many varieties.

Pumelo, *Citrus Decumana*, also the Shaddock.—A much larger tree than the orange tree, and with larger leaves. Fruit in China grows up to about 8 in. in diameter, light yellow when ripe; there are two varieties, one containing light-lemon-coloured flesh, the other one, the Amoy pumelo, has a red flesh, and is much more esteemed, as it is sweeter and more juicy.

Rose-apple, *Eugenia Jambos*.—A tree up to 20 ft. high with long, narrow, shiny leaves. Fruit about the size of a hen's egg, white or pink and rose-scented, with a rind not very thick, and rather brittle and hollow.

Water-melon, *Citrullus vulgaris*.—Distinguished from other melons by its large deeply-cut leaves. Fruit roundish, smooth and dark-green, up to 18 in. in diameter, flesh red or white and very watery.

The grape, apple, pear, plum and peach are also cultivated in China, but the apple, pear and plum are very poor fruits.

A NOTE ON THE ADMINISTRATION OF PANCREATIC EXTRACT IN THE TREATMENT OF SPRUE.

By THOMAS R. BROWN, M.D., Baltimore, Md.

IT is, of course, almost axiomatic that treatment is usually much less effective in those diseases of which the cause is not definitely determined. Sprue must be regarded as one of those diseases, however, notwithstanding the view of Ashford that the disease is a moniliasis due to infection with *Monilium psilosis*, a belief based on experimental studies in animals and upon immunological and serological tests and shared by many, although some, as Kohlbrugge, believe that other varieties of monilia are also factors in the disease. There are others who feel equally strongly that the disease is of dietetic origin, and possibly represents a real deficiency disease, as McGarrison has suggested, while still others believe that a great variety of fermentative organisms, having as a common property the power of markedly modifying the chyme, notably in rendering its reaction acid, may give rise to the disease. On the other hand, there are certain authorities who insist that sprue is not a true clinical entity, but that it includes a group of diseases, the main features of which are markedly similar, although different causative factors may be present in different groups of cases. That the true aetiology of the disease is still regarded as doubtful is shown by the definition given of it by Castellani and Chalmers in the last edition (1919) of their "Manual of Tropical Medicine": "Sprue is a chronic catarrhal inflammation of the alimentary canal of unknown cause, characterized by a peculiar ulcerative condition of the tongue and mouth and by the passage of large, pale, smooth motions, the symptoms waxing and waning periodically." Perhaps this doubt in regard to its aetiology has, however, rather increased interest in this disease, whether on the part of those who see it in the tropics, where it is widely distributed or in sporadic cases which come with increasing frequency from the tropics to the temperate zones, while recently renewed interest in the disease in the United States has been stimulated by the work of Wood, who has shown that it is definitely met with in certain of our large southern States, where it has previously been misinterpreted as an atypical form of pellagra. As regards its fundamental pathology—the sub-epithelial inflammation of the tongue and intestinal tract leading to great destruction of the glandular tissue in the latter, with secondary inflammatory changes of various types—there is still a considerable difference of opinion as to what represents the true primary lesion of the disease and what the effect, secondary to the state of tissue starvation produced by it.

As regards treatment, as one would have expected, many suggestions have been made. Castellani and Chalmers, in their "Manual of Tropical Medicine," give as essential factors "co-operation

of the patient, rest in bed, suitable clothing, removal of fermenting bowel contents, a proper diet, medical treatment, and change of climate."

As regards diet, the milk diet has had the greater vogue, but other diets have been as enthusiastically, if not as generally supported, notably the milk and fruit diet, fruit diet—especially strawberries—meat diet, meat and milk diet. As regards medicinal treatment, Castellani got very good results by the administration of large doses of sodium bicarbonate; yellow santonin is strongly supported by Begg; Manson used castor oil quite frequently; Ashford believes in the specificity of his monilium vaccine; while, in the Philippines, salvarsan and neosalvarsan have been administered with success, at least temporarily, in a number of cases.

In 1916 we reported (*Johns Hopkins Hospital Bulletin*, October, 1916, No. 308) a very interesting case of sprue from Porto Rico in which, by very careful stool studies, we demonstrated complete absence of pancreatic ferments; while, since then, we have had four additional cases: three from the Philippines, one from Porto Rico—all absolutely atypical—in which very careful studies showed the same complete absence of these ferments. These latter four cases will be reported in the *American Journal of Medical Sciences* in the near future; the manuscript is now in the hands of the editor.

All these cases had long histories; all had tried various forms of treatment, though none the vaccine therapy; all had been on various diets; obviously each had tried change of climate, and in all cases, while temporary improvement had been noted, there had often been relapses without apparent cause. All these cases had a history of not less than a year's duration, two of them much longer; the symptoms were absolutely classical in all cases, and the disease had been diagnosed in all cases as atypical sprue by authorities in tropical medicine; two of the cases showed gastric achylia; two gastric sub-acidity; one gastric hyper-acidity; we did not regard these findings as fundamental cases, as of the four which showed marked improvement the gastric contents practically returned to normal *pari passu* with their clinical improvement.

We estimated quantitatively the pancreatic ferment in the stool in all of our cases, and, in the duodenal contents obtained with the Einhorn bucket in three of the five cases, the quantitative findings of the ferments in the stools being made once in one case, twice in three cases, and five times in one case. The methods we employed were previously described by us in the *Johns Hopkins Hospital Bulletin*, September, 1912, No. 259; July, 1914, No. 281; and elsewhere. All the patients' bowels were thoroughly moved the night before, a definite amount of milk containing 4 per cent. of fat was given, this was followed by a purge of magnesium sulphate, the entire stool for the following eight hours was collected, and, if less than 700 c.c. were obtained, a small water enema was given in order to get the remaining portion. This was diluted to a definite amount, centrifugalized,

tubes of various dilutions prepared for the estimation of the trypsin and diastase; the Fuld casein method being employed for the former; the Wohlgemuth method for the latter; while, for the estimation of lipase, 1 per cent. monobutyrin was used, in each case specimens being incubated for half an hour in a water bath of body temperature before being tested; the same methods with slight modifications in regard to dilution were used in estimating the duodenal contents. These findings were so striking that we felt it was wise, in addition to the rest-dietetic-hygiene treatment ordinarily employed in these cases, to try the administration of pancreatic extract; we gave of this 5 to 10 grm., with 20 to 40 grm. of calcium carbonate or calcium lactate three times a day, two hours after the larger feedings, and the results were so striking in four of the five cases, and the improvement produced so definitely coincidental with the administration of the drug continuing during use of the extract, and, with the withdrawal, improvement so definitely stopped, that we felt that in these cases at least there was no doubt that it was playing a very considerable rôle in the patients' welfare. In the fifth case—the most chronic of all—there was no improvement during administration of pancreatic, nor indeed after any other treatment, except the administration of neosalvarsan. Of the four cases that have shown such marked improvement, three were kept under observation for several months and seemed very markedly better, in fact almost clinically well, and the striking symptoms of the disease itself entirely disappeared, while one case which we have been able to follow for over four years has kept clinically absolutely well by the constant administration of the extract, although, if we stop it for only a short time, the tongue becomes sore, there is a feeling of discomfort in the abdomen, with a tendency to diarrhoea and the passing of more voluminous stools. Incidentally, numerous examinations of this patient show that there is still a complete pancreatic achylia. These cases are very interesting because they show beyond any question that, in a certain number of cases of sprue at least, complete absence of pancreatic ferment is found, although it is impossible to say whether it is due to destruction of the glandular tissue, or whether it is functional and presumably brought about by the marked changes in the character of the chyme and in the intestinal ferments. It is interesting to note that, while many people have called attention to the probable deficiency of pancreatic function in the disease, as suggested by the character of the stool, nevertheless we have not been able to find any observations preceding ours proving this by quantitative estimation of the ferments, while it is noteworthy that a very careful search of the literature fails to demonstrate any careful histological notes on the changes in the pancreas in this disease, although Castellani and Chalmers note that the pancreas may be "normal, inflamed, or cirrhotic"; but, as far as we can tell, this is based on macroscopical findings alone.

It would be interesting to try the effect of intes-

tinal extract and possibly liver extract in intractable cases of the disease, such as one of our series; in other words, in that group of cases where glandular destruction is probably so great that very little, if any, hope can be held of the approximate return to normal intestinal secretory activity.

Although our cases are few, and although one of the five did not respond to treatment, the fact that in all of these cases of well-marked and long-standing sprue, a very careful quantitative study showed complete lack of pancreatic ferments; and the further fact that, in four of the five cases, there was no question that the administration of pancreatic extract led to a very marked improvement in the condition of the patient, would make us feel that, in addition to the well-recognized methods of treatment in this disease, notably rest, proper diet and change of climate, it would be very wise to try, in addition, the administration of pancreatic extract, as we believe that in some cases at least this will increase markedly the chances of improvement, and possibly lead to at least clinical cure of the disease.

THE TREATMENT OF BUBONIC PLAGUE BY INTRAVENOUS INJECTIONS OF IODINE.

By S. M. VASSALLO, M.B.

Medical Officer, Uganda Protectorate.

THE treatment of plague (bubonic or otherwise) has, on the whole, been so unsatisfactory, and the disease has usually been accompanied by such a high mortality, that the following observations based on an analysis of twenty cases may be of interest.

A small epidemic broke out in a part of the Eastern Province of Uganda; 20 individuals were affected, of whom 17 were natives and 3 Indians. The mortality among these 20 patients was only 4, the other 16 recovering within a period varying between eight and twenty-three days.

The treatment consisted in the administration of an iodine solution intravenously. Its strength was: iodine, 1 dr.; potassium iodide, 1 oz., and alcohol, 20 oz.; the strength thus is double that of tincture iodii mitis of P.B. 1914. A small quantity is freshly prepared for each case, and 10 or 15 minims in about 2 oz. of distilled water, warmed to body temperature, are injected into a vein with the usual antiseptic precautions.

The dose is repeated whenever it is thought necessary, for this the temperature is the best indication. In an ordinary untreated case of bubonic plague with a temperature, say of 104° F., the usual course of events is for the temperature to remain steady or go up higher, and then after a few days, two or three usually, the patient passes into coma and dies. After an intravenous injection of iodine the temperature, usually within twelve hours, comes down one or two degrees, this remission may be permanent or only temporary; should it be only temporary then another injection is indicated, and I usually give then half a dose in the same amount of dis-

tilled water, if within twenty-four hours of the first injection.

If the case is going to recover the temperature now comes down more rapidly, perhaps three or four degrees, rising perhaps another degree in the evening, and it then keeps on remitting until it reaches the normal.

The injection is repeated, with the above reservation, every other day until the temperature becomes normal, and a last one is given when it has been normal for a day or two.

The following cases show the behaviour of the temperature in favourable cases, after the iodine treatment has been instituted:—

Case 1.—Admitted the evening of August 25, 1920: temperature 105° F.; iodine 15 minims. August 26: temperature, a.m. 103°, p.m. 103·6°. August 28: temperature, a.m. 100°, repeat iodine; temperature p.m. 101·2°. August 28: temperature, a.m. 100°, p.m. 100·4°. August 29: temperature, a.m. 98·6°, p.m. 99·2°; repeat iodine. August 30: temperature, a.m. 98°, p.m. 98·4°, afterwards uninterrupted convalescence.

Case 8.—Admitted in the afternoon of September 3, 1920; temperature 104° F.; iodine 15 minims. September 4: temperature, a.m. 103°, p.m. 101°; repeat half iodine. September 5: temperature, a.m. 100°, p.m. 103°. September 6: temperature, a.m. 102°, p.m. 102°; repeat iodine. September 7: temperature, a.m. 99°, p.m. 102°. ? Gland suppuration. September 8: temperature, a.m. 98°, p.m. 99°; repeat iodine. September 9: temperature, a.m. 97°, p.m. 97°; then convalescence.

Case 11.—Admitted evening of September 5, 1920; temperature 105° F.; iodine 15 minims. September 6: temperature, a.m. 104°, p.m. 105·4°; repeat half iodine. September 7: temperature, a.m. 103·4°, p.m. 104°; repeat half iodine. September 8: temperature, a.m. 99°, p.m. 100°. September 9: temperature, a.m. 98·4°, p.m. 100°. September 10: temperature, a.m. 99°, p.m. 102°; repeat iodine. September 11: temperature, a.m. 99°, p.m. 99°. September 12: suppuration of affected gland, incision, then convalescence.

Case 15.—Admitted as suspect on September 6, 1920; temperature, a.m. 101°; in the evening temperature 105°, and plague positive microscopically; iodine 15 minims. September 7: temperature, a.m. 101·4°, p.m. 104°. September 8: temperature, a.m. 102·4°, p.m. 104°; repeat iodine. September 9: temperature, a.m. 98°, p.m. 104°; repeat half iodine. September 10: temperature, a.m. 100·3°, p.m. 99°; repeat half iodine. September 11: temperature, a.m. 99°, p.m. 99·4°. September 12: temperature, a.m. 98°, p.m. 97°; then convalescence.

The period of convalescence varied according to the severity of the attack and according to the suppuration or otherwise of the affected glands, but it never presented any unduly delayed course.

It is instructive, on the other hand, to compare the series of events in cases which end fatally.

Case 10 is especially interesting, as the patient was at the time under an attack of subtertian malaria. This case is given in detail.

First seen on September 13, 1920. Temperature, a.m. 105° F., p.m. 105° F. Small swelling of right femoral glands; very painful. Positive subtertian, positive plague. Quinine injection intramuscular, iodine intravenously.

September 14.—Temperature, a.m. 105°, p.m. 105°. Swelling grown bigger and very painful. Repeat quinine, and half iodine.

September 15.—Temperature, a.m. 104.4°, p.m. 101.8°. Glands still very painful. Repeat quinine and iodine half dose.

September 16.—Temperature, a.m. 103°, p.m. 104.4°. Worse to-day. *B. pestis* found in blood, but no malarial parasites. Repeat iodine and inj. digitalin.

September 17.—Temperature, a.m. 102°, p.m. 102°. Poorly. Glands hard and painful. Repeat inj. digitalin.

September 18.—Temperature, a.m. 103°, p.m. 104°. Signs of heart failure. Repeat iodine and digitalin.

September 19.—Temperature, a.m. 104°, p.m. 104°. Blood full of *B. pestis*. Repeat iodine.

September 20.—Died.

The remissions in this case were hardly present. It, of course, presented unusual difficulties, as one could not judge how much of the temperature was malarial and how much was due to plague.

The iodine treatment does by no means invariably promote recovery, if the infection is of more than, at the most, thirty-six hours duration, the prognosis is bad. It is likely that a case which was primarily bubonic becomes, if untreated, septicæmic after a short while, and then even with daily injections there is no improvement and the patient dies.

Of the four fatal cases, one was Case 10 described, and of the other three, two were seen on the third day of illness when already semi-comatose, and the fourth died of pneumonic plague (there was in this case an original gland infection in the axilla). Another bad prognostic sign is if there is no remission in the temperature after the third or fourth day of treatment.

One interesting point in this connection is the coagulation of the blood. In three out of the four fatal cases, when the needle was run into the vein, the blood came out in drops of an almost semi-fluid character. This, I am inclined to think, is of prognostic importance; it is a known fact that in plague post-mortems the blood is found to be more coagulated than in ordinary cases. So long as the blood flows freely the prognosis is more cheerful.

How the iodine acts I am not prepared to say; it is conceivable that it either (1) kills the *B. pestis* *in situ* in the gland by direct action, or (2) it stimulates the gland to increased production of phagocytes which engulf and destroy the bacilli. The fact remains that of the sixteen recoveries in only two did an abscess form, while in all the others the swelling gradually diminished till no trace of it was left.

In all cases the diagnosis was microscopically positive.

It should be remembered that the greater number of these cases occurred in natives, where treatment was rendered more difficult by their ignoring prodromal symptoms; such a setback will vanish when one is dealing with Europeans or others more civilized, and then the patient will be treated right at the beginning.

In conclusion:—

(1) It seems that the above treatment is efficacious for cases of bubonic plague.

(2) It does not seem though to have any influence in pneumonic or septicæmic plague, at least one case of bubonic originally which later became septicæmic, and one case of pneumonic in which the treatment was instituted, ended fatally.

(3) The most important factor is the early treatment of cases, up to twenty-four hours the results are most encouraging, and also, to a lesser extent, up to thirty-six hours within the onset of symptoms. After that the chances diminish very rapidly, and the case is practically hopeless by the end of the second day.

(4) The best guide as to prognosis and to the repetition of injections is the temperature. In septicæmic cases, perhaps, it may be worth while to try bigger doses.

(5) In fairness it should be added that Commissioner Booth Tucker, of the Salvation Army, first evolved this treatment about 1912 or 1913.

I wish to express my thanks to Dr. C. A. Wiggins, Principal Medical Officer of the Uganda Protectorate, for permission to publish this report.

Diagnosis of Gonorrhœa in the Female by Staining Methods (Charles C. Norris, M.D., and Henry B. Mielckelberg, M.D., *Journal of the American Medical Association*, vol. lxxvi, No. 3, January, 1921).—The authors summarize their investigations as follows: During the acute stage of the gonococcal infection the diagnosis is generally made without difficulty, as the clinical signs are more or less significant; if doubt exists, film preparations can be depended upon.

During the chronic stage the clinical signs are less characteristic than during the acute stage, and the examination of film preparations is less satisfactory.

The presence of gonococci can be demonstrated by film preparations from every case if a sufficient number of correctly performed examinations are made, but even under the most favourable circumstances, positive film examinations can be obtained in only a relatively small proportion of cases.

A single negative smear examination is without significance.

From a practical standpoint all cases should be regarded as of gonococcal origin until proved otherwise. Without desiring to underrate the value of staining methods in diagnosis, the authors believe that their usefulness has been considerably overestimated.

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APRIL 1, 1921.

"FRUITS IN THE FAR EAST."

Mr. Ford's article on "Fruits in the Far East" is an interesting contribution which it would be well to follow up. The botanical and scientific interest is one thing, the therapeutic is another more important to the doctor and to the community. Yet we know little of the latter, for we possess but

few sources of information whence to gain any but the most meagre knowledge of the essences, the salts, the virtues or the drawbacks to the ordinary fruits of our orchards and gardens at home, and less still of the properties of tropical fruits. We study closely or we have sources of information whereby to satisfy our inquiries concerning almost all of our (so-called) medicinal plants, but a sharp line is drawn when the subject of mere fruits such as those used on our tables is broached. Yet the medicinal plants affect us but seldom in our lives, but the fruits well-nigh daily. The botanist deals with the grouping and classification of the plant, placing it according to the family, the natural order, the genus and the species it belongs to, and gives an indication of the nature of the taste, &c., be it sweet, bitter, acrid, astringent and so forth. But as to the causes of these properties we have but little information, and still less as a profession have we any knowledge of (perhaps it is want of ready access to) the chemical and therapo-chemical effects of the many compounds which we ingest with our table fruit. We have, moreover, but mere popular and gossip guides when even our fruits should be eaten. Some say before breakfast. In the East fruit is the first thing taken by many at the breakfast meal. At home and in the tropics at both luncheon and dinner fruit is on the table and is well-nigh invariably taken after the meal. Curiously enough at fashionable dinners in England pine-apple is sometimes served in place of hors d'œuvres and before the soup, although why pine-apple is chosen for this place of honour it is impossible physiologically to say. And so it may be said of all fruits; we know so little about the physiological, and still less about the dietetic and the therapeutic value of our fruit and their juices that it is a mere matter of gossip as to whether they are "good for you" or the opposite. What do we approximately know, or rather, what does tradition tell us? Instead of sheltering oneself behind the editorial "we," let it be what does the doctor know of the subject. Allowing that he has an average doctor's knowledge of the subject at home and abroad, it may profit to set it forth and exhibit the ignorance common to most medical men. In general terms he advises his patient to take fruit. Should it be fresh or raw, or cooked? What kind of fruit? he is asked. "Oh, anything in season." Would you advise tinned or canned fruits, or fruits preserved in tin or glass? Would you advise it before, after, or between meals? Would you recommend the juice of the orange only or the whole orange pulp? Accustomed to such interrogations, he deals with such queries with his usual tact and, shall we say, shuffles out of the cross-questioning as he would when interrogated about the qualities of such and such wine—say, Sparkling Moselle, Tarragona port or Marsala, by his patients. He has never been instructed during his medical training in such matters, neither in regard to fruits nor wines, and unless he has the experience which age brings he camouflages to the best of his ability. Would you advise stone fruits, such as cherries, plums, lychees?

Knowing nothing of differences between the dietetic physiological value of these and any other kinds, and having nothing but his boyhood experience to guide him, he answers this and that as it occurs to him at the moment. He has the traditional legend about an apple, &c., being gold, silver or lead to the digestion according to the time of day it is taken. He is met with some of his patients telling him an apple before going to bed at night is their safety guard against constipation and the best of soporifics. How do the fruit juices agree with the gastric juices? Do they favour or interfere with the action of the pepsin and hydrochloric acid normally met in quantity in the process of digestion? Probably not, and experienced physicians in the tropics especially advise fruit to be taken first thing in the morning before the bath (and instead, perhaps, of the morning cup of tea) and again at 11 a.m., when the stomach is empty. We agree with this, and would establish it as an axiom to be obeyed. At 11 a.m. the stomach amongst all peoples has a desire for "something," and they as a rule take their breakfast or déjeuner about that time in both Europe and Asia. The heavy British breakfast at 8 to 9 a.m. is well-nigh peculiar to the Briton; almost all peoples have their heavy morning meal later—10 to 12 noon, say, 11 a.m. They who breakfast at 8 a.m. on their meal of porridge and milk, egg, or egg and bacon, or fish, bread and butter, tea or coffee, have completely digested this by 11 a.m. Children at this hour are usually given milk and bread with butter or jam, but adults take nothing in an ordinary way. Instead the city man often stems the craving by a whisky and soda; the well-off lady by a glass of sherry; the poor woman by a glass of beer; the farm labourer in England by his "beaver," more often than not a glass of beer. Something is required by the body at this hour, and in most countries outside Britain an ordinary heavy meal. Physiologically we would better our condition were fruit taken at this hour. Alcohol by itself, be it whisky, sherry or beer, on an empty stomach is detrimental always, and at 11 a.m., "when the sun is over the foreyard" and such gossip, it is particularly so, for it seems to be the outstanding hour at which the system demands "something." With many if alcohol is taken alone it is the origin of the drink habit and causes more drunkards than any other. If nothing is taken at this hour, by the time luncheon or midday dinner is taken the stomach is in a state of catarrh, and dyspepsia is induced with all its evils and disabilities as regards work afterwards during the afternoon.

The rickets of children, the swelling of the feet and puffiness of face and of the ankles, especially of women, will be found to be due to the absence of antiscorbutic food, be it fresh vegetables or fresh fruits. The quality of fruit seems to matter little, for almost all seem to possess in their juices salts of a kind which are endowed with antiscorbutic qualities which are essential to bodily welfare. Some there are that seem detrimental. Rhubarb, be it regarded as a fruit or vegetable, is so plentifully imbued with oxalate crystals that cannot be digested

or dissolved by some "constitutions," and as these are eliminated by the kidney tubules cause pain over the lumbar region, and not infrequently produce renal colic in an acute form, due to the presence of gravel or small calculi and hæmorrhage from the kidney at times to an alarming extent. Gooseberries, when taken in quantity, produce a toxin which leads to puffiness of face and lips, feet and hands, and a generally toxic state lasting for, it may be, twenty-four hours. Strawberries are anathema to many digestions. Tomatoes, with their plethora of oxalates, are provocative of renal troubles, and even hot-house grapes taken in quantity are to some people capable of producing a feeling of hepatic and digestive discomfort, a consequence only to be expected, seeing that wines with their disabilities are familiar examples of the detriment arising from the juices of grapes and their contained salts. Fruits have their therapeutic effects as have other foods, be they animal or vegetable, and an excess of either is fraught with unwholesomeness. On the other hand, absence of fruit juices causing disease is never more marked than in sprue. The craving of a patient for strawberries, in a woman suffering, apparently dying even, of sprue anæmia, brought to light the fact that strawberries in inordinate quantities, 8 lb. to 10 lb. daily, cured this disease. Many other patients with the same disease have been cured by the same fruit, as much as 12 lb. of strawberries being taken in twenty-four hours, to the exclusion of every other form of "food" or nourishment.

All this goes to prove how little we know of the therapeutic value of fresh fruits, due for the most part to the little knowledge we possess concerning the chemistry and physiological action of both tropical and home-grown fruit. One thing seems certain: fruit should be taken by itself, either in early morning or between meals at 11 to 12 o'clock in the forenoon. The digestive fluids engaged in dealing with ordinary food are not thereby interfered with, and the specific action of this or that fruit upon the economy of the individual can be gauged and estimated either as regards its general value or the idiosyncrasy of the individual.

Mr. Ford has done us a great service. One of the most distinguished of our botanists in the tropical field, he has given us a text to start with. The technical name and classification are the foundation of all scientific knowledge, for in each district a different name is bestowed upon the local fruits according to the language or dialect in use, and different writers may be reporting upon the action of one and the same fruit, from the observer being ignorant of the scientific name of the fruit he is dealing with or the natural order to which it belongs. A most important factor for the natural order is usually tenanted by salts of an allied series having a "group" action in the economy. The alkaloids are the goal of the organic chemist in his search through the vegetable kingdom for drugs, but we want a botanical-physiological and dietetic chemist to teach us what we as practitioners of medicine want to know.

Annotations.

Multiple Polyposis of Intestinal Tract (J. E. Struthers, *Annals of Surgery*, Philadelphia, vol. lxxii, No. 6, December, 1920).—The author gives a description of thirty-nine cases of this condition, in which all but five suffered from diarrhoea; of the five, two patients had constipation, two abdominal distress, and one duodenal ulcer. In the more severe cases in which the colon and the rectum were involved by polyposis, the onset of the disease was gradual, becoming progressively worse over a period of many years. Twenty-two out of the thirty-nine were operated on, with a mortality of 9 per cent. Questionnaires were sent to fourteen medical patients and replies were received from twelve. Four are so much improved that they consider themselves well, three have simply improved, one is unimproved and another is growing rapidly weaker.

Sodium Morrhuate in Pulmonary Tuberculosis (M. Biesenthal, *American Review of Tuberculosis*, Baltimore, vol. iv, No. 10, December, 1920).—The author describes the treatment of twenty-five patients with sodium morrhuate. A 3 per cent. solution in sterile water with 0.5 per cent. phenol was used. The solution was placed in a sterile bottle sealed with a rubber cap and again sterilized in an autoclave. An initial dose of 0.125 c.c. increased in semi-weekly injections was given subcutaneously until the dose of 1 mil was reached, when a single injection was given each week. No special or serious reactions were noted.

Some Statistics of Filariasis (J. W. W. Stephens, *Annals of Tropical Medicine and Parasitology*, vol. xiv, No. 3, February, 1921).—The author comes to the conclusion that microfilaria is commoner among those with signs of filarial disease than among those without signs of filarial disease, and that signs of filarial disease are commoner among those infected with microfilaria than among those not infected with microfilaria. There is no evident correlation between various microfilaria rates and the corresponding filarial disease rates.

Amoebic Dysentery in Siam (R. W. Mendelson, M.D., Bangkok, Siam, *Journal of the American Medical Association*, January 29, 1921).—The author is of opinion that amoebic dysentery that does not respond to emetine in one form or another will not be cured by any other treatment. It is true that symptoms may be temporarily relieved by other methods, but as a rule the result is only temporary and disappointing. Every new treatment that is suggested gets a trial at the Bangkok Hospital, only to end in being supplanted by the hypodermic injections of emetine.

Menthol and Peppermint in Acute Catarrhal Conditions of the Respiratory Tract (Hugh McGuigan, Ph.D., M.D., Chicago).—The explanation of the action of menthol and peppermint in common colds is unsatisfactory and apparently avoided in most books on pharmacology and therapeutics. The author comes to the conclusion that the efficacy of menthol and peppermint in the respiratory passages is due to changes in the surface viscosity of the mucus and on the membranes producing the exudate.

Have Differential Leucocyte Counts any Value? (J. W. W. Stephens, W. Yorke, B. Blacklock, J. W. S. Macfie, C. Forster Cooper and H. F. Carter, *Annals of Tropical Medicine and Parasitology*, vol. xiv, No. 3, February, 1921).—The authors think that their preliminary experiments which deal solely with attempts to determine the mononuclear percentage of the blood of normal persons, suffices to show that considerable difficulties surround what has hitherto been regarded as a simple matter.

Hereditary Haemorrhagic Telangiectasia with Recurring (Familial) Hereditary Epistaxis (H. I. Goldstein, M.D., *Archives of Internal Medicine*, vol. xxvii, No. 1, January, 1921).—The author summarizes his investigations as follows:—

(1) Thirty-one families afflicted with this disease are on record in medical literature; some of the cases are not altogether typical of this condition which have been included in this review, but they are all on record.

(2) No general treatment seems to be effective, owing to the congenital development defect of the vascular system inherent in these patients.

(3) Local treatment may reduce the number and severity of the hæmorrhages and improve the general condition of the patient.

(4) Dermatologists, rhinologists and internists should examine patients who complain of these skin lesions (telangiectasia or recurring hæmorrhages) more thoroughly and analyse the family histories. In this way some previously undiagnosed or undiscovered cases may be brought to light.

(5) A case of hereditary telangiectasia with severe recurring nasal hæmorrhages is recorded, and cases are mentioned of two married sisters, seven children and the patient's mother, all in the same family, suffering from the same disease, a total of eleven cases in one family.

The Etiology of the Common Wart (Lyle B. Kingery, B.S., M.D., *Journal of the American Medical Association*, vol. lxxvi, No. 7, 1921). The author confirms the investigations of previous observers on the etiology of common warts, which are caused by a filtrable virus. The period of incubation from the time of inoculation to the development of well-defined lesions is apparently much longer than pertains to other filtrable viruses.

Abstracts and Reprints.

THE TREATMENT OF SPRUE BY MASSIVE DOSES OF SODIUM BICARBONATE.¹

By ALDO CASTELLANI, C.M.G., M.D., M.R.C.P.

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In carrying out, some time ago, certain researches on sprue, I noticed that to render strongly alkaline the urine of patients suffering from this malady it was necessary in most cases to give sodium bicarbonate in much larger doses and for much longer periods than in normal individuals or patients suffering from certain other diseases; the alkali tolerance was therefore increased. During this investigation I noticed that the administration of massive doses of bicarbonate, instead of the usual small or moderate doses so often given in the malady, had frequently a most beneficial effect, especially as regards improvement in the intestinal symptoms, and seemed to help greatly the action of the dietetic treatment.

The routine method of treatment I now use in sprue is generally the following: The patient is kept at complete rest in bed and is placed at first on a strict milk diet. The mouth is kept scrupulously clean by using a diluted alum-carbolic mouth-wash.

Glycer. alum	...	...	...	aa	℥iv
Glycer. ac. carbol.	...	...	...	...	...
Aq. rosæ	...	...	...	ad	℥iv

One teaspoonful to a tumbler of water.

And when painful patches on the tongue are present, a cocaine-carbolic mouth-wash will be found useful.

Cocaine	...	...	...	...	gr.v
Ac. carbol.	...	...	...	...	℥j
Glycer. borac.	...	...	...	...	℥vj
Aq. rosæ	...	...	...	ad	℥iv

Half to one teaspoonful to a tumbler of water.

A mild alkaline tooth paste should be used to brush the teeth with several times daily. Quite a number of private patients I see come to me toothless; apparently the first advice most of them had received on arriving in Europe was to have all their teeth extracted. I have never seen, in cases of genuine sprue, the course of the disease arrested by such a procedure, and I strongly deprecate it, except in those cases in which the sprue condition of the mouth is complicated by true severe pyorrhœa. If there is history of recent amœbic dysentery—and this is in my experience very often the case—I give at once a course of six or twelve emetine injections.

In addition to these measures, the patient is placed on an intensive alkaline treatment, which is carried out (a) by giving very large doses of sodium bicarbonate by the mouth, and (b) by intravenous injections of a 2 or 1 per cent bicarbonate solution.

In a number of cases the administration of large

doses of bicarbonate by the mouth is sufficient. It is given in drachm doses, 1 dr. three times daily for the first three days, 2 dr. three times daily for eight or ten days, and afterwards 3 dr. or more three times daily for several weeks. No untoward effects are noticed, but not rarely the patient feels and looks somewhat drowsy for a few days. If the drowsiness becomes marked the dose should be decreased. Papain, takadiastase, pancreatin, &c., may be added to the bicarbonate, but the effect of these digestive drugs is not very brilliant in the acute stage of the malady, and I generally omit them altogether during the first weeks of the treatment; later, such preparations, and especially pancreatic extracts as emphasized by Brown, are useful. When the diarrhœa is very severe 5 to 10 gr. of salol may be added to the bicarbonate, but powerful astringents should always be avoided. The addition of a little salol to the powders is also useful when the urine becomes too strongly alkaline. In those rare cases in which there is constipation, magnesium carbonate gr. x-xx may be substituted for salol.

The standard formula of the powders is:—

Pulv. cinnamom.	...	...	...	gr.ss
Pulv. ipecac	...	...	...	gr.ss
Pancreatin, papain, or takadiastase	...	...	...	gr.ijj
Salol	...	...	...	gr.v
Sod. bicarb.	...	...	...	℥ij

The powders should be given in half a tumbler of water. The amount of the ingredients should be varied according to the symptoms presented by the patient, as already stated, and some of the drugs (cinnamon, ipecacuanha, pancreatin, salol) may be left out altogether. At times in conjunction with the powders I have found it useful to administer bile salts (sodium taurocholate gr. ij in eachets t.d.).

In certain peculiar cases of sprue characterized by severe asthenia and a distinct hyperpigmentation of the skin, in addition to the bicarbonate treatment, I have given adrenalin with good results.

I have used intravenous injections of sodium bicarbonate so far in six cases, always in combination with the internal administration of large doses of bicarbonate as described above. Ten to twenty ounces of a 2 or 4 per cent. solution of bicarbonate is given slowly every day or every other day until twelve injections have been given; then the patient has a rest, but the intensive alkaline treatment by the mouth is continued. After an interval of one or two weeks another course of injections is given, and a third course may be necessary after a further interval. The intravenous injection should be given preferably by the gravitation method, observing all the precautions commonly used in intravenous therapy. In the sterilization of the solution care should be taken to prevent any excessive formation of the carbonate, and this end is best achieved by taking the precautions suggested by Sellard—namely, the bicarbonate solution should be put in strong narrow-mouthed bottles which are filled almost full in order to reduce the air space to a minimum, tightly-fitting stoppers being used. As

¹ Reprinted from the *British Medical Journal*, March 5, 1921.

an additional precaution, these bottles can be sterilized in an atmosphere of carbon dioxide; this can be easily obtained by raising the autoclave to the boiling temperature, while water at the boiling point is provided at the bottom of the autoclave, and a handful of bicarbonate is thrown into the hot water.

I have used the bicarbonate treatment here described in a large number of cases, and in eleven, most of them private patients, I have been able to follow the course closely. My experience has been that sprue cases having this treatment, in addition to the usual dietetic measures, improve more rapidly than patients having only the dietetic treatment, though of course there are exceptions. It is interesting to note that the intestinal symptoms seem to be much more beneficially influenced than the mouth symptoms.

As regards the mode of action of the intensive bicarbonate treatment, I have very few remarks to offer. At one time I believed that large doses of bicarbonate by decreasing the acidity of the intestinal contents might check the growth of monilia fungi, considered by some authors to be the true cause of the malady, and by Low and myself to be merely the cause of certain symptoms, as, for instance, the frothiness of the stools. If recent hypotheses concerning the etiology of the malady be proved correct, then a different explanation will have to be found. At any rate, there appears to be little doubt that in sprue a certain degree of acidosis is often present, and that an intensive alkaline treatment is indicated.

Conclusion.

The administration in sprue of massive doses of sodium bicarbonate by the mouth and intravenously, in conjunction with the usual dietetic measures, gives satisfactory results in a large number of cases, especially as regards the intestinal symptoms of the malady.

THE HISTORY OF ACIDOSIS.¹

By WILLIAM HENRY DONNELLY, M.D., Brooklyn, N.Y.

THE term acidosis was first used by Naunyn in 1906, and was applied by him to an abnormal metabolic condition in which hydroxybutyric acid was formed. The broader use of the term has been the rule since the writings of Henderson in 1909, Sallards in 1914, Peabody in 1914, and Howland and Marriott in 1916.

The theory of acidosis had its inception in 1850, when a French investigator named Boussingault made the discovery that large amounts of ammonia frequently appeared in the urine of advanced diabetic patients. Modern writers frequently ascribe this discovery to a German observer named Hallervorden, who, in 1880, repeated and confirmed Boussingault's work, and so stated in his writings. The reason for this is evidently the highly unfavourable criticism of Boussingault's

German contemporaries as to his methods and technic. However, Schaffer has shown that Boussingault's technic was distinctly superior to that of all of his contemporaries. In the meantime A. Kussmaul, in 1874, made the first clinical observation in noting the dyspnoea in advanced diabetic patients, which he named air hunger. His description was classical, describing the expansion of the thorax in all directions, the following of complete inspiration by complete expiration, with absence of cyanosis, and of congestion of the veins of the neck.

In 1883, E. Stadelmann, in the search for acid radicals to account for the presence of ammonium salts in the urine, discovered betaoxybutyric acid. In this paper he set forth the acid intoxication theory and indicated the logical alkali therapy as it is used at the present day. In the same year von Jakse published a paper describing the substance which gave Gerhardt's ferric chloride test in diabetic urine, and positively identified it as acetoacetic or diacetic acid. He included diacetic acid in his acetone theory of diabetic coma, having proved definitely while working in his father's laboratory that the volatile substance obtained from the distillation of fever and diabetic urine is acetone. Soon, however, acetone was proved to be negligible in its toxic effects, and von Jakse was unable to substantiate his contention that acetone was the mother substance of the other so called acetone bodies.

On the other hand, Walter, in 1877, had demonstrated that mineral acids were capable of combining with basic groups in the blood, and that ingestion of these acids by animals proved fatal, although the blood serum remained faintly alkaline to litmus. Magnus-Levy, in 1899, showed that the chief alkali robber in dyspnoeic coma was betaoxybutyric acid. Knoop, of Strassburg, in the opinion of Folin made in 1905 the most important advance since Stadelmann, namely, demonstrating that fatty acids are the main source of supply of the acetone bodies. Folin states that these fatty acids which contain an even number, and not less than four carbon atoms, can be oxidized to oxybutyric acid.

Walter had found a uniformity of symptoms in the administration of hydrochloric acid to rabbits. If the quantity inserted into the rabbit's stomach exceeded 9 gm. to the kilo of body weight, death came within a few hours. The phenomena were ushered in by increased frequency of respiration, each respiratory movement being more laboured, deeper, and accompanied by forcible heaving of the body walls. The animal lost the power of motion and lay in one position. Fifteen minutes after this stage was reached the dyspnoea ceased, blood pressure fell, the heart action weakened and stopped, although respiration ended before the heart ceased to beat entirely.

Up to this period in the literature nothing had been done on the carbon dioxide tension either of the blood or of the alveolar air. Haldane and Priestley, in 1905, devised a method of getting alveolar air by means of a three-quarter inch hose with a glass mouth-piece. Lindhard, in 1911, reported a method of getting the alveolar air by a Krogh glass valve with a small flexible lead tube with an interior bore of 1 mm. which was passed as far as comfortable into the pharynx. Then

¹ Abstracted from the *New York Medical Journal*, August 21, 1920.

Plesch, in 1909, suggested the rebreathing of a limited amount of air until it was in equilibrium with the air in the alveoli.

In 1914, Peabody and Boothby, working in the Peter Bent Brigham Hospital in Boston, evolved an apparatus with a three-way valve by which the patient breathed into a bag for a given length of time. They filled the bag with 1,000 c.c. of air so as to allow of a deep inspiration on the part of the patient. Their apparatus was a modification of one described by Perges, and they agree with him that the optimum time of breathing into the bag is twenty-five seconds, and the average carbon dioxide tension is about 45 mm.

Howland and Marriott warn us that acetonuria and acidosis are not synonymous terms. The acetonuria of starvation or increased food requirement rarely results in acidosis. Acidosis probably depends on the same underlying cause as most cases of cyclic vomiting. Marriott, in 1916, brought out a colorimeter of standard phosphate solution coloured with phenolsulphonaphthaline. This was primarily meant for use in children, and the child was made to breathe into a bag twenty-eight to thirty-two seconds, avoiding collapse of the bag, and then the air was passed through a test solution coloured in the same way as the standard tubes and then compared with them. The colorimeter tubes are arranged in series with a ground glass background, and are calculated so as to give at once the carbon dioxide index in the same way as a hæmoglobinometer. With this test set the normal carbon dioxide tension in the adult is shown to be 40 to 45 mm.; in children 3 to 5 mm. lower. A tension of 30 to 35 shows a mild degree of acidosis, one of 20 imminent danger, while in coma with acidosis it may be as low as 8 to 10 mm.

The first adaptation of a clinical method of estimating the carbon dioxide given off from the blood plasma or the carbon dioxide tension of the blood was reported to von Slyke in 1915. He found that the results attained were the same as those with the alveolar air methods and this has been repeatedly verified since that time.

The prophylaxis of acidosis in intestinal conditions in children is advised by Schloss using in severe cases the veins or longitudinal sinus with a four per cent. bicarbonate of soda solution, or a two per cent. solution subcutaneously. In March, 1920, in a lecture before the Harvey Society at the New York Academy of Medicine, Marriott expressed his belief in the causation of acidosis by the anhydremia produced by the loss of body fluids in diarrhoea, and stated that he had found the most rapid and efficacious method of combating the acidosis in intraperitoneal injections of normal saline which promptly corrected the dehydration of the blood.

Cyclic Vomiting.—While there is a definite and serious difference of opinion among pediatric observers as to the connection between cyclic or recurrent vomiting and acidosis it must inevitably be considered in any history or investigation of acidosis.

It seems that the first important description of the disease was by Gruere, in France, in 1838-1841. Marfan, in 1905, and other French writers have associated recurrent vomiting with acetonæmia, and have

even called it acetonæmic vomiting, on the ground that acetone is so constantly present in the urine. There is no evidence, as Marfan admits, that acetonæmia produces the attack, since acetonuria is seen in so many other affections. D. L. Edsall, in 1903, pointed out that the presence of betaoxybutyric acid indicated the possibility of the condition being an acidosis, and advised full doses of sodium bicarbonate even in the intervals. Griggith thinks this has much in its favour, but is wanting in certain proofs, and the difference between acetonuria and acidosis is to be borne in mind, as was pointed out by Howland and Marriott in 1916. Mellanby in 1911, and Sedgwick in 1912, found a urinary secretion of creatin at the time of the attack, and believed that this was due to abnormal metabolic changes. Sedgwick also thinks that adenoids are a powerful ætiological factor. Richardiere, in 1905, believed that the occasional co-existence of icterus was an evidence of the involvement of the liver in the disease process. Charles Hunter Dunn is so convinced of the connection between this condition and acidosis that he divides the latter subject into recurrent vomiting and acid intoxication.

LACTIC ACID MILK.¹

By DEWITT H. SHERMAN, M.D., and HARRY R. LOHNES, M.D.
Buffalo.

PARTICULARLY when made through the fermentative action of the *Bulgarian bacillus*, lactic acid milk has been considered efficient to inhibit the action of putrefactive germs in the intestinal canal, and hence to lessen the absorption of their putrefactive toxic products. To the *Bulgarian bacillus* was given most of the credit for this beneficial result; but according to Herter, Bryce, Mendel, Bastedo and others, the *Bulgarian bacillus* has no real value in this direction. If this is true, how has lactic acid milk a therapeutic effect?

To aid digestion, hydrochloric acid is the acid of our choice; but it has been stated that other acids can be substituted for it, and that they will produce more or less good results. Consequently, if the fermentative action of the special bacillus, the *Bulgarian bacillus*, is theoretically correct but practically doubtful, the beneficial results from lactic acid milk must be due largely to the acid. If the results do depend upon the acid, they must follow because the acid stimulates the gastro-intestinal function by raising the acidity to a point at which it not only aids the gastric digestion, but later stimulates the digestive secretions of the upper intestine, when it is poured into the duodenum.

It is questioned, however, whether acids other than hydrochloric acid are aids to digestion. Often the presence of lactic acid in an adult gastric analysis indicates a hypochlorhydria; and if hydrochloric acid is administered, it prevents the formation of lactic acid, which under the circumstances is considered an abnormal acid, an acid disturbing

¹ Abstracted from the *Journ. Amer. Med. Assoc.*, vol. lxxv, No. 14, October 2, 1920.

rather than aiding digestion. If this theory, as applied to the adult stomach, is correct, it is not the lactic acid itself which gives lactic acid milk its therapeutic effect.

The question then arises: How does it aid? According to the newer ideas of the gastro-enterologists, it is Meltzer's law of "contrary innervation" that has so much to do with the gastro-intestinal functions. It is agreed, according to this law, that whatever increases the amplifications of the waves of peristalsis will, through this increased relaxation and contraction, increase the function of the gastro-intestinal canal.

Lactic acid milk differs from ordinary sour or spoiled milk, because it is sour, uncontaminated, sterile milk. At the Children's Hospital, for the last eight months, we have been using lactic acid milks in the difficult feeding cases, and have been very much pleased with the results. We are inclined to think that our results are as good as, if not better than, with the much lauded protein milk.

Protein milk is advised especially for six main reasons, e.g., the high protein with its high calcium; the full fat; the low lactose; the low soluble salts; the fine curd during digestion, and the concentrated food. If our contention is true, it is the lactic acid in the protein milk which is the stimulator of digestion, both gastric and intestinal, and the sterilizer of the intestinal contents.

With our method of mixing we get four of the points of advantage which are emphasized in protein milk. We can secure a relatively high protein, a full fat, the fine curd during digestion, and the concentrated food. The amount of lactose, which is nearly the same as in sweet cow's milk, may be considered a disadvantage. But this is not a major disadvantage, because lactic acid milks contain only 1.5 per cent. more lactose than does protein milk.

In protein milk great stress is laid on the decreased salt content. In comparison lactic acid milk does contain nearly twice as much of the soluble salts as does protein milk and less of the insoluble salts, the calcium and magnesium.

In the few cases in which we must use a low soluble mineral element and a high insoluble mineral element, protein milk is without doubt the better food; but the accuracy of the needs of the infant for this chemical relationship of the soluble and insoluble salts has not been demonstrated without question.

In the first place, we use two kinds of lactic acid milk, one made of skimmed milk, and the other of whole milk. This makes the formulas very flexible as regards the use of fat, the tolerance for which is so commonly broken in this class of case. We are likely to start with the skimmed lactic acid milk, and we work it up to the desired ratio with its diluent, or as high as it can be borne. As the child's digestive tolerance permits, we replace the skimmed lactic acid milk by the whole lactic acid milk.

We find Marriott's statement true that an un-

expectedly high ratio of lactic acid milk, especially if it is skimmed, can be used. With this high ratio we secure a fairly high protein, which is considered so essential.

In order to make the formula smooth, we have mixed the lactic acid milks with barley water. The resulting mixture has an attractive appearance, and we find the barley water to be a great aid in holding the mixture in even suspension. We make the barley water of a strength of from 0.5 to 0.75 per cent.

The great difficulty with any lactic acid preparation is the control of the acidity as the buttermilk ages. If the acidity is too slow and if the milk is not clotted in fine curds, it clumps into a large mass when boiled, even though stirred. If the acidity is too high, the infants either refuse or reject it. But the difficulty is how to get that acidity and keep it. We have worked out two simple methods which we hope time will prove to be satisfactory and successful. In both the methods we boil the milk first so as to have an uncontaminated fermentation.

The first method is to warm the milk, which has been boiled and then cultured, and put it away, either in a fireless cooker or the child's ordinary ice-box so frequently found in the household. If the cultured milk is put away in the evening at 85° F., in the morning it will be found to have undergone a proper fermentation with an acidity of 70 to 90. To check further fermentation we put it on ice, or, preferable, rapidly bring it to the boil. I mention rapid boiling, because slow boiling lengthens the period in which the warmth is sufficient to favour fermentation, and hence the increase of acidity. During this boiling, active stirring with a Dover egg beater is essential to keep the curds fine and prevent clumping. This boiling renders the fermenting *Bulgarian bacillus* inert, and leaves a milk sour and sterile—a milk that is very different from a sour milk spoiled by various ferments, and a milk that is probably as efficient as if the *Bulgarian bacillus* were active.

The second method that we have worked out is still simpler. It is well known that the fermentation of lactic acid milks continues up to a certain point of fermentation—that is, of acidity. At about 60, as measured by the decinormal sodium hydroxide solution, spontaneous fine clotting occurs. At about 170 to 190 the acidity destroys or renders inactive the fermenting bacillus, and the process consequently of itself ceases.

We have taken the milks, either skimmed or whole, and in the morning added the ferment (1 oz. of ferment to 31 oz. of milk), and stood them away in a warm place till a convenient time the next morning. Knowing by numerous tests that the acidity has reached about 170 to 190 by that time, we dilute the skimmed milk or whole lactic milk with an equal amount of skimmed or whole sweet milk that has been boiled, and we have the desired acidity of from 75 to 95. Because the acidity is above 60, there occurs a spontaneous fine clotting

of the added sweet milks with a resulting homogeneous, smooth, clotted mixture. This mixture of lactic acid and sweet milks is then boiled or not, as we desire. It is then further modified, as the case demands, and put away on the ice. It keeps nicely, changing very little in the following twenty-four hours, the change being much less if boiled a second time.

This is surely a simple method, which can be carried out, even in the household of the ignorant. It requires merely the making of a certain amount of whole or skimmed lactic acid milk, to which can be added an equal amount, or more, of whole or skimmed sweet milk. The small clots, which are formed during the process of fermentation, are flocculent in character and are very easily digested. Should the infant reject the lactic acid milk of the correct acidity, the curds are small and soft, and show evidence of prompt digestion. To supply the carbohydrate needs we have added corn syrup; first, because of its contained variety of sugars, and secondly, because it is cheap. We have had cultures taken from an unopened can, and have found it germ free.

Our series of cases tested on lactic acid milks has amounted to only about twenty-five, and we would consequently be presuming to make a report on such a small number. Given a mixture of the proper acidity, we find the infants very quickly seem to like it, and furthermore, those with rebellious stomachs retain it nicely. The effect on the stools is marked and quickly obtained. The foul, putrefactive odour, so common in this class of hospital ease, promptly ceases, and the stools become even, smooth, and of good colour.

The infants seem rapidly to become less toxic, as is shown by the disappearance of various signs and symptoms.

(1) Their appetites improve, and they take the formula well and are likely to retain it.

(2) They soon lose their ashy grey colour. Their mucous membrane, especially of the lips, shows a decided betterment in colour. This occurs before the gain in weight has been marked.

(3) Their temperature becomes more stable, and an early monothermia occurs.

(4) They soon become less fretful—in other words, are more happy.

(5) Their sugar tolerance seem less easily broken, and gas formation is less likely to complicate the condition.

(6) The loss of weight, or stationary weight, is soon likely to be overcome by a substantial weekly gain, and calorie feeding seems easier to reach.

The age of the infant seems to make very little difference with lactic acid milks. Finkelstein does not advise protein milk before three months of age, though this rule is not inflexible. But we have used lactic acid milks in the very young with as good results as with older infants. As an example, one of our patients was a premature infant of seven months' gestation, weighing 4 lb. at birth. At the end of its first month it weighed 5 lb. It was

started on its second day of age with a one-half skimmed lactic acid milk. This was gradually raised to a two-thirds mixture of lactic acid milk, which was made of one-half skimmed lactic acid milk and one-half whole lactic acid milk. This is approximately a 2 per cent. fat mixture.

The therapeutic effects of lactic acid milk or buttermilk are too often only superficially understood. The curds formed from it are small and easily cared for. The acidity seems to stimulate both the gastric and the intestinal function, and the sterilization of the protein fermentation of the intestinal canal is marked. This change of intestinal state markedly lessens the absorption of toxic products, and the whole process of metabolism is hence beneficially affected.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.
No. 10, December, 1920.

Questions of Hygiene in the Dutch Indies (J. J. van Loghem).—The paper discusses tropical hygiene in general, which is always, the writer says, a question of possibilities rather than the realization of an ideal. No system can be successfully applied unless it is suited to the particular social organism for whose benefit it is devised. A certain stage of civilization must be reached before primitive populations will consent to any form of prophylaxis; and a still higher stage before simple vaccination can be supplemented by measures for ensuring a healthy water supply, good drainage, &c. Properly governed and prosperous collectivities alone lend themselves to a thorough system of sanitation.

On the Specific Treatment of Epizootic Lymphangitis by Sterilized Cultures of Cryptococci (L. Nègre and A. Boquet).—An organized trial of this treatment among horses procured seventy-one cures out of eighty-six cases. One relapse only occurred, and that in a benign and localized form. The failures comprised animals who had reached the last stage of the disease and developed secondary infection, and those in whom the treatment was not followed up. The vaccine is prepared from four- to six-week cultures grown at a temperature of 35° C. in Sabouraud's medium, pounded in a dry state and mixed with a 5/1000 solution of carbolic acid in water at the rate of 5 mg. of the culture to 1 c.c. of solution. The emulsion is then heated for one and three-quarter hours at 65° C. on a water bath. The injections are given in the neck in weekly doses, beginning at 1 c.c. and increasing by 1 c.c. per week to 5 c.c. The latter dose, which must in no case be exceeded, is then repeated until cure. As a rule no improvement is seen until the fourth week. Four doses may be sufficient, but from eight to twelve

are usually necessary. The average length of treatment is two months, during which time the animals are not prevented from working unless, perhaps, on the day following an injection.

Studies in Piroplasmosis and Jaundice in Algeria. VIII.—Concerning a super-acute attack of Bovine Piroplasmosis caused by very numerous small annular forms (E. Sergent and G. Esperandieu).—A cow attacked a second time by foot and mouth disease suddenly developed fatal symptoms and was killed. At autopsy tiny annular forms of an undetermined species of piroplasma were recovered from the blood in the proportion of 246 per 100 red cells. There was a complete absence of pear and bigeminate forms, and the bodies did not exceed 1 micron in diameter; nevertheless, the authors are inclined to regard them as very young forms of *P. bigeminum* (= *P. bovis*), dividing by binary fission so rapidly as to produce death in a few hours without giving time for the larger forms to evolve.

On a Haemogregarine and its Multiplication Cysts in a Lizard of the Genus Iguana (Tropidurus torquatus Wied) (Mme. Phisalix and E. Tejera).—The haemogregarine was discovered in a lizard which died of cold shortly after its arrival from Venezuela, and, to the writers' knowledge, has not previously been described. Intracellular forms seen in the heart and peripheral blood were sausage-shaped, curved inwards, rounded at both ends, and unpigmented; maximum length 16.8 microns, maximum breadth 6.3. These forms did not take the usual stains, a few fine, scattered, chromatic granulations alone being seen near the centre where not covered by the nucleus. Of the two extracellular forms contained in the blood plasma, one apparently consisted of intracellular forms freed by hemolysis; the other was larger and more active, with a round, irregularly situated nucleus, and staining readily. Its greatest length was 20 microns and average diameter 6; the anterior end tapered a little. This form was observed to escape from macromerozoite cysts. The liver contained both macromerozoite and micromerozoite cysts. The former, which were also present in the gall-bladder and were very numerous, were seen in all stages of development, some of them showing eight merozoites ready to escape. They were oval in shape, and measured 27 microns from pole to pole by 19 microns in diameter. The nucleus was round and took the stain well, while the cytoplasm only stained slightly. The micromerozoite cysts were found in large quantities in the liver only. They were ovoid in shape, rather narrow at one end. From pole to pole they measured from 21 to 27 microns, with a maximum diameter of from 19 to 21 microns. The smaller ones contained fine granules, the other from two to twenty-four merozoites with elongated nuclei staining sharply; none of them appeared to have reached the final stage of development, however, for no small free form of the parasite was found either in the plasma or red cells.

A New Case of Intestinal Coccidiosis in Man due to an Isospora (F. Noc).—The subject, a soldier, had spent two years in Madagascar, but had never been stationed in the Dardanelles or in Macedonia. As a prisoner in Germany for four years, he had on several occasions had to struggle with rats for his food and suffered severely from diarrhœa. When seen by the writer in Senegal he was passing three or four black, liquid, foul-smelling stools per day, which, on examination, showed *Isospora* cysts, oöcysts of *Coccidia*, and lozenge-shaped fatty acid crystals. The oöcysts were fairly numerous, generally elongate, sometimes ovoid and short, 22 to 23 by 10 to 16 microns, with a fine envelope enclosing either one ovoid or spherical spore or two spores close together; when fully mature the oöcysts measured 32 to 33 by 16 microns, were ovoid in form with narrow end drawn into a neck, and each spore contained four falciform bodies measuring 2.7 by 6 to 7 microns. No micropyle could be definitely made out. Fifteen days after a third injection of novarsenobenzol (with thymol) both oöcysts and *Isospora* cysts had at least temporarily disappeared.

The Trypanosomiasis Focus at Tehoa (Chad Territory) (Muraz, Chad Prophylactic Sector).—Tehoa is the largest of a group of three villages on the banks of the Tandjile river, 57 kilometres west of Lai. The morbidity from trypanosomiasis at Tehoa is 40.51 per cent. of the population, i.e., higher than anywhere else in Chad territory. In the other two villages it is 10.94 and 8.27 per cent. respectively. Contrary to the assertions of the natives, *Glossina palpalis* was found to exist on the Tandjile. Instructions were therefore given to move Tehoa and the more badly affected of the other two villages to a selected spot 10 kilometres away, to clear the river banks of trees and brushwood for 500 metres up stream and down by natives already infected, and to construct a bridge in order that the river may be crossed more quickly than in boats.

Trypanosomiasis of the Pig in French Guinea (E. Aldigé).—An epidemic of trypanosomiasis which broke out in a wooded valley of Mamou during the rainy season carried off thirteen out of twenty-two pigs in six weeks. The symptoms appeared suddenly and developed with great rapidity, death usually occurring in from twenty-four to forty-eight hours and sometimes in twelve. The organism was a trypanosome measuring from 12 to 14 or from 21 to 25 microns in length and from 1 to 1½ in breadth, with long flagella; a few short, broader forms showed a short flagellum. It resembled *T. pecaui* or *T. brucei* more nearly than *T. dimorphon* or *T. ezalhoui*. The parasite multiplied so quickly that at death the animal's blood was practically a pure culture of trypanosomes and the red cells had all disappeared. Tartar emetic and orpiment, or a mixture of the two, proved useful as remedies if administered at the onset of the disease.

Contribution to the Study of Flagellosis in Euphorbia (A. Laveran and G. Franchini).—Working in Italy and Paris last summer, the authors found flagellosis in five species of euphorbia at Bologna. In two of them (*E. nereifolia* and *E. virosa*) the parasite was not of the normal form, repeated examinations having failed to reveal flagella, and the question arises whether another protozoon infecting euphorbia may not exist. No flagellosis was found in Paris, but the weather was not favourable to its development. Specimens of *E. sauliana* and *E. pilosa* were successfully inoculated (in Paris) with cultures of *Herpetomonas ctenocephali* var. *Chattoni*. Two white mice were inoculated in the peritoneum with the latex of an *E. nereifolia* containing parasites and developed a slight infection.

Biological Study of Trichomonas Intestinalis (E. Pringault).—In a case of dysentery in a child of 6, attributed to *Trichomonas intestinalis*, the parasites were very unequal in size and exceedingly mobile. The flagella could not be seen clearly enough to be counted, even under a high power lens and after treatment with a solution of gum arabic. One or two vacuoles containing bacteria could be distinguished in the cytoplasm, and as many as four red blood cells had been "phagocytosed" by some specimens. The average life of the parasite was from twelve to forty-eight hours, its vitality being greater in thin than in thick stools. No encysted or divisional forms were seen, though numerous examinations were made. Cultures were obtained in a mixture of ascitic fluid and Ringer's solution, but not in other media tried. The parasite died immediately in all the common antiseptics, and was susceptible to both low and high temperatures.

Contribution to the Study of the Distribution of the Bilharziosis in French Equatorial Africa (P. N. Clapier).—The bilharziosis are very rare in Middle Congo and Lower and Middle Oubanghi, in spite of the fact that they are common beyond the northern and eastern boundaries of these regions. The current of infestation, from the Soudan in the north and the valley of the Nile in the east, is too weak, and the dilution of the cercariae in the rivers too great to cause any real contamination. In the village of Irébou, on the right bank of the Congo, however, five cases of intestinal bilharziosis were discovered among the fifty inhabitants. There was no concomitant urinary bilharziosis. The author considers that in the isolated instance of Irébou the infection may have been introduced by immigration, or, on the other hand, that the snails preferred as hosts by the cercariae may concentrate in certain parts of the great rivers and so tend to infect localized areas only.

Phlebotomi in the Marseilles District (E. Pringault).—One hundred and ninety-six specimens (59 female and 137 male) were captured between July 15 and September 29. Of the males two were identified as *Phlebotomus minutus* Rondani, five

as *P. sergenti* Parrot, and 130 as *P. perniciosus* Newstead. The insects could not be found in the daytime in the hedges or walls near the house, but in the late afternoon they were easily caught inside first-storey windows facing S.E., and on outside walls at a height of from 1 metre to 1.5 metre from the ground. The average length of life after capture was four days for the males and fifty-six for the females.

"*Boukchem*"—*An Enzootic Disease of Kabyle Dogs* (A. Donatien and G. Espérandieu).—An epizootic of "Boukchem" ("nose disease") raged among dogs in Constantine (Algeria) from December, 1919, to April, 1920. The condition, which is exceedingly contagious in the early stages and invariably fatal for the Kabyle dog, resembles the distemper of Algerian puppies rather than rabies, though it differs from the former in that it is common to all ages, and the pustules seen in distemper do not occur. The onset is characterized by running from the nose, which develops into a mucous and then a muco-purulent discharge, accompanied by intense irritation in the nasal cavities. Later on extensive disturbance of the nervous system is generally observed; the hind legs frequently become paralysed, and in most cases acute hyperaesthesia of the neck prevents the wearing of a collar. The animal preserves its intelligence, eats and drinks, and shows no sign of anger. Death occurs on an average in from three to twenty days; in rare cases it is delayed for four or five months, or even longer, the dog remaining partially paralysed. In a less common type of the disease the respiratory system is particularly affected. At autopsy tumours containing *Spiroptera sanguinolenta* were seen along the intrathoracic oesophagus in nearly every case. The disease would seem (as corroborated by experiment) to be confined to the canine race, and in its fatal form to attack Kabyle dogs almost exclusively. When contracted by European dogs its course is mild; in half-breeds it is of intermediate severity. Experiment failed to throw any light upon the method of transmission, which, however, is apparently not by bite.

An Inquiry into Trypanosomiasis in Middle Oubangui (Ibenga-Motaba) in 1914 (F. Ouzilleau, in charge of the Brazzaville Pasteur Institute).—On a tour of inspection through the province of Ibenga-Motaba, the author examined 20,000 natives and treated 2,016 (representing 15.2 per cent. of the entire population) for trypanosomiasis. The drug used was atoxyl, and the dose 1 grm. for adults; 3,050 injections were given in all. In every district but one he found, like Piot in 1919, a much higher proportion of cases among children between the ages of 3 and 15 than among adults; in the villages lying between Niangui and Impfondo (inclusive) the percentage was 8.7 for adults and 53.9 for children. In the same region (Niangui to Impfondo) he observed that infected adults presented no outward clinical signs of the disease, although the children showed the usual swollen glands and puffy, pale faces. In the villages

situated along the banks of the Motaba and Ibenga he was surprised to find only a moderate amount of trypanosomiasis, in spite of the fact that the district offers the best possible conditions for the tsetse-flies and other blood-sucking insects—*Glossina palpalis*, *G. fusca*, simuliidæ, chrysops, ixodidæ and mosquitoes—which abound there in enormous quantities. It was, moreover, in this region that the children were not infected in a notably higher proportion than the adults. The author was able to trace fifteen of the twenty-seven cases treated by Heckenroth in 1911; of theseq survivors six had received arsenophenylglycine and nine atoxyl—the latter perhaps in insufficiently large doses.

An Investigation into the Demographic Conditions and Present State of Trypanosomiasis in the Bangala Country (French Equatorial Africa) (P. Clapier).—The Bangala tribes comprise the inhabitants of the districts around the points of confluence of the Oubangui, Sangha, Likouala and Congo rivers. Within the last twenty-five years the race has dwindled almost to extinction, the reasons being (a) the decline of the birth-rate owing to criminal abortion, hemp smoking, syphilis, and trypanosomiasis; (b) the heavy mortality, especially among the children, due to trypanosomiasis, pulmonary disease, malaria, &c. For every six births there are seven deaths from trypanosomiasis alone. A certain number of children and young people are seen in the villages, but a large proportion of these are slaves from other tribes. In the writer's opinion the Bangala race is doomed to disappearance at an early date, and he urges the necessity for persistent prophylaxis among the other races in the same region which have, as yet, suffered less severely. From his experience as a whole he concludes that during the early stages of an epidemic of trypanosomiasis the number of children attacked is nearly always lower in proportion than that of adults, and only exceeds it in exceptional cases; on the other hand, when the disease has existed in a district for some years the children are affected to a greater degree than the adults.

Remarks on Onchocerca Volvulus (J. Rodhain).—The author records the existence of onchocerciasis in the Belgian portion of the Congo basin, where he has found it to be fairly generally distributed.

With reference to local reactional phenomena excited by the presence of the worms, he finds that though in many instances there are no signs of acute inflammation properly so called, in others the tumours contain a blood-streaked pus; in the latter cases the death of worms in the interior of the tumour may lead to abscess formation, though this is not a usual development. On the other hand, temporary pain and inflammation due to some accidental cause (such as small-pox vaccination) may reveal the presence of previously hidden tumours.

Contrary to the experience of others, the writer's records include a case of *Onchocerca volvulus* in a European. The subject was a Belgian who, after living intermittently in the Congo for many years, was ultimately sent home with a liver abscess and continuous fever. Before leaving Africa a hard nodule in the shoulder, which had at intervals occasioned pains of a rheumatic nature for some eight years, was excised and found to contain several male and at least one female *Onchocerca volvulus*. At the same time *Microfilaria perstans* was found in the blood.

Also in disagreement with general opinion, the author has seen several cases in which the nodules undeniably adhered to the skin and appeared to have originated therein; the tumours in question were all very small.

THE UNIVERSITY OF LIVERPOOL.

Examination List, March 1921.

The following candidates have obtained the Diploma in Tropical Medicine: R. Nixon, M.B., Ch.B.; A. S. Richmond, M.B., Ch.B.; J. M. Skinner, M.B., Ch.B.; R. B. Stewart, M.B., Ch.B.; Marion Thomson, M.B., Ch.B.

Medical News.

Japanese Government Disinfection Office.—The brush industry, which flourished in Osaka during the war, is now in a serious condition owing to the campaign against infected shaving brushes in various parts of the world. The department of agriculture and commerce of the Japanese Government has decided to open a national disinfection office, probably in Kobe where all imported bristles and other animals' hair for the manufacture of brushes will be disinfected.

School for Trachomatous Children in the Argentine.—A school for children infected with trachoma has been opened at Tucuman. This school is the outcome of a suggestion made at the Medical Congress held in that city in 1916.

Radium Deposit in Chili.—According to newspaper reports radium has been discovered in the saltpeter region of Chili and the Chilean Government have decided to create a research radium laboratory.

Malaria Sanatorium at Rome.—The Asilo Antimalarico Comunale was recently inaugurated at Rome to provide a home and schooling for the children of families living in the malaria infested marshes around Rome. The institution was founded on the initiative of Professor Marchiafava, one of the leaders in the campaign against malaria.

Greek Congress of Hygiene and Demography.—The first Pan-Hellenic Congress for Hygiene and Demography is to convene at Athens in April. In connection with it there will be a scientific exhibition, which will remain open for two months, from April 25 to June 25.

Original Communications.

TRYPANOSOMIASIS.¹

By Surgeon Rear-Admiral P. W. BASSETT-SMITH,
C.B., C.M.G., F.R.C.S., D.T.M. and H.

THE great interest of trypanosomiasis is that the whole of our knowledge of it is comparatively recent; we have discovered its haunts, found out its cause, how infection is carried, also to a very marked extent what is necessary to be done to prevent and cure. It is one of those conditions in which a wide knowledge is required, for man, many vertebrates, insects, and minute protozoal organisms have to be studied and the interlocking of the various pieces in the puzzle has been and still is a study of considerable difficulty.

When Livingstone crossed Africa he found what were known as "fly zones," where certain animals could not live; the fly and the mortality were connected. Bruce showed what it was that connected them, the trypanosome, which now bears his name; this was the fundamental discovery.

But to-day I can only treat on human trypanosomiasis in Africa, with the disease called sleeping sickness which it produces.

Though there are a great number of other trypanosomes found in mammals, fish, reptiles, &c., which are well known, and those affecting horses, mules and other domesticated animals in Africa, Europe, India, Asia and America, which are of great economic importance (to say nothing of the wild game). The first record of sleeping sickness is found in the "Navy Surgeon," by John Atkins, a Naval Medical Officer, written in 1734, who describes the sleeping distemper common among the natives on the Guinea Coast; and in 1803 Winterbottom showed that the disease was well understood by the slavers, who would not purchase slaves with enlarged glands. In 1891 a case was brought to London and studied by Mackenzie and Manson. In 1902 Forde and Dutton made a great step forward, they found trypanosomes in the blood of a white patient suffering from a prolonged kind of fever called "Gambia Fever," which is now known to be the preliminary condition to sleeping sickness. From that time forward, as is usual, these parasites were frequently found when looked for in this area in Europeans and natives.

The next great discovery was that of Castellani who, in Uganda in 1903, demonstrated that in all cases of sleeping sickness the trypanosomes could be found in the cerebrospinal fluid, which thus connected up the fever cases with trypanosomes in the blood and sleeping sickness cases with trypanosomes in the spinal fluid.

Bruce and his co-worker then showed by geographical investigation that round Victoria Nyanza

the infected area for man was that in which a tsetse-fly, *Glossina palpalis*, was present, and many biological experiments were carried out which proved that the fly transmitted the disease. Though it is quite possible that a drop of blood might be transferred directly and cause infection, the most general method is that after the fly has ingested the blood a process of development takes place in it, small forms of the trypanosome pass into the salivary gland and again enter the peripheral blood of man, as shown by Kleine, Bruce and others. Monkeys were the most satisfactory animals to work with.

In 1910 Stephens and Fantham described a new form found in Rhodesia spread by the *G. morsitans*, the same fly that conveys "Nagana," the common animal disease. This new trypanosome is, however, generally considered to be quite distinct from *T. brucei*, and though the Rhodesian form is not very common in man it is very fatal. Lastly, in 1909, Chagas found quite a different form at Minas Geraes in Brazil, spread by an entirely different host, a true bug *Conorrhinus megistus*.

As first known sleeping sickness was found mostly on the West African Coast from Senegal to Loanda. It was soon found out that it was not restricted to the sea coast, but extended a long way inland up the Niger and Congo. It is believed to have been carried from the West Coast up the Congo to Central Africa in and after the Stanley-Emin relief expedition, by his porters and followers; but in Uganda in 1900, when Cook first noticed the disease, it was then widespread and had been present some time, and the islands on the east side of the Victoria Nyanza were infected, and in 1902 the infection had spread to the eastern shore and inland. It is undoubtedly true that the disease spread along the trade routes and is now advancing north into Wadelai, Victoria Nile, and the Soudan.

Rhodesia is another special endemic area from which, though not heavily infected, the disease is spreading.

It will thus be seen that from the West Coast of Africa the disease extends inland up the Niger to Timbuctoo, and by the Congo to Uganda, and southwards we have the whole of Rhodesia infected.

Two types of African trypanosomes are generally recognized in man: *T. gambiense* and *T. rhodesiense*. Castellani, from his biological and clinical studies, separates the former into two: first, the West Coast form, from which the infection is relatively mild; and secondly, the Uganda form, in which the severity of the cases is very much greater. This latter form Kruse and Chalmers call *T. Castellani* (200,000 deaths).

Clinical	Locality	Carrier	Form
T. fever ...	West Coast	<i>G. palpalis</i>	<i>T. gambiense</i>
Sleeping sickness	Niger, Blue Nile	"	"
	Soudan, Congo		
T. fever ...	Rhodesia	<i>G. morsitans</i>	<i>T. rhodesiense</i>

When a European first becomes infected, he may or may not suffer any discomfort from the bites of

¹ Third Emeritus Lecture given at the Middlesex Hospital Medical School, February, 1921.

the tsetse-fly; these bite in the day, most frequently on the back of the neck, and will persistently follow a victim in the same way as the Klegg flies do in the marsh districts at home. Soon after, with an incubation period of ten days to some months, a slight fever may come on, generally of short duration but recurring; this is not relieved by quinine, there is slight anæmia, and for a long time the correct diagnosis is not made, then definite symptoms appear, enlarged glands in the posterior triangle of the neck, fever, tremors of tongue, deep hyperæsthesia, patchy œdema and erythema. While the peripheral blood only is affected there is a chance of recovery, but directly the trypanosomes pass into the central nervous system there is practically none. It is in the rate of progress that the Uganda cases vary so much from the coast ones, but this may be due to the usual intensity of infection and high mortality of a disease getting into new ground *vide* measles in New Caledonia. In Rhodesia the case mortality is very high and duration of sickness is only a few months. It may be of interest to tell you of the case of an Italian professor who, while working in his laboratory on trypanosome infection, using those of "Surra" for horses, and that of "Nagana" for African animal disease, acquired a fever, at first put down to intestinal toxæmia, then paratyphoid, finally trypanosomes were found in his blood. For this disease he went to the Pasteur Institute, Paris, for treatment. The question was: Had he become infected with an animal trypanosome, *evansi* or *brucei*? This was previously quite unknown. Now that the controversy has again started that *brucei* and *rhodesiense* are the same, this case becomes more interesting, though cross biological experiments so far go to prove that *rhodesiense* is quite distinct.

This patient has been successfully treated and is now well.

It is probable that after the bite of the glossina the lymphatics carry the virus to the nearest glands, these become enlarged and at first act as a filter, but soon the blood becomes infected and we have a general trypanosomiasis set up. Throughout, however, lymphoid tissues are very prone to become specially implicated. When the central nervous system becomes involved, very marked cellular changes are produced in the brain. These have been worked out in detail by Mott. He pointed out that around the vessels in the cortex there is peculiar lymphatic perivascular infiltration. Stephenson, in brain sections, has shown that the trypanosomes in the brain are not confined to the vessels, but are distributed in an irregular manner.

The question of immunity is a very vexed one if, as it is probable, the disease has been present among the natives of the West Coast for a great number of years, it is possible that some acquired immunity may have been obtained and thus explain the relative mildness of the disease among them now; on the other hand, there is very little scientific evidence that such is the case, but

much more to show that the particular strains of *T. gambiense* may have developed a lowered virulence. It is undoubtedly the case that when the disease in 1901 was first investigated in Uganda its virulence among the natives was exceedingly high. We know that many wild animals, antelopes, pigs, crocodiles, &c., act as hosts for the trypanosomes, and on these there is no pathogenic action. It seemed, therefore, interesting to determine whether the mother can infect her young through the placenta, whether if so infected the young will survive and show any immunity to the original strain.

I have maintained a strain of *T. rhodesiense* since 1913 and *T. gambiense* since 1916, and these have been the source of study. The *Rhodesiense* strain at first kept up by passages in rats, subcutaneously inoculated, increased in virulence by passage so that the period of infection was reduced to ten days, occasionally one would live for a much longer period with its blood full of trypanosomes. Very rarely did these if pregnant abort. I was struck by this fact, which is contrary to generally accepted opinion. In 1914 I examined the embryo found in the uterine sac which had been removed from the mother; smears of the liver showed well-grown trypanosomes; this was the first definite example that the flagellates were able to pass through the placental membrane. Lately I have been able to demonstrate free trypanosomes in the liver, spleen, and heart blood of embryos of guinea-pigs for both *T. gambiense* and *T. rhodesiense*; in the foetal placenta one finds enormous numbers of irregular forms, free nuclei, centrosomes with free flagella, and occasionally fully developed long forms similar to those found in the mother. It seems as if from the maternal blood teeming with trypanosomes large numbers pass into the fetal placenta, where the great majority appear to become destroyed, a few passing on to the organs of the embryo.

An infected female guinea-pig gave birth to two healthy young, she suckled them both and they grew up to be apparently normal animals; the mother died in due course (four months), and on examination the two young were found to be infected; these lived on for five to six months, that is, from some transferred semi-immunity they were able to resist the effects of the virus for one to two months longer than the mother, but I do not draw any conclusions from this one case. It, however, opened up the question again of method of infection. Lanfranchi injected trypanosomes into bitches that had recently given birth to puppies to see if infection would take place through milk.

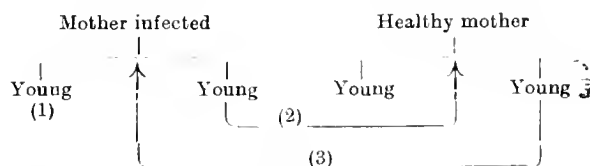
The milk and blood of the puppies were injected into rats; one rat showed infection when injected by milk, but inoculation with puppy blood gave negative results in every instance.

Sergeant has also transmitted the camel trypanosome by means of the mother's milk.

I tried a cross experiment with guinea-pigs to show:—

Transference by birth and suckling.

" " by birth and suckled by healthy mother.
 " " by suckling but born of healthy mother.



(1) In this case the animal born and suckled was infected and died.

(2) In this case the animal born, not suckled, was infected and died.

(3) In this case the animal suckled but not born of an infected mother lived and showed no signs.

In this case there was no natural transference through the milk.

I have a second similar experiment going on now.

It seems quite possible that a gradual acquired immunity has been built up in the wild animals, but non-pathogenic trypanosomes in vertebrates are so common that it is a very difficult subject.

A very interesting point about trypanosome infection is the cyclical character of the outburst of trypanosomes in the peripheral blood. This has been described by Ross and Thompson.

With regard to *gambiense* infection, I would like to describe a case of my own. In 1915 a number of marines were landed as B.E.F. on the Campo River in the Cameroons where, among other evils, glossinas were abundant. One of these men developed malarial fever and later trypanosomes were found in his blood; he with others were being sent home, but they were met by the *Mocwe*, the German raider. These men were fallen in, and all but this man and one other were taken prisoners and sent to an internment camp for the period of the war. He made his way from Boston to New York and finally to England, and came under my treatment at the Seamen's Hospital, Greenwich, in February, 1916. At that time he was very ill, with palpitations and anæmia, and was mentally depressed; he had lost weight and suffered from irregular attacks of pyrexia. There was no adenitis, no hyperæsthesia, no tremors, no rash, the reflexes were normal, and cough was present with each attack of pyrexia; his systolic blood-pressure was low and pulse showed a marked dirotic wave, urine was free from albumin, no ova in fæces. Blood—red cells 4,400,000, hæmoglobin 90 per cent., white cells 6,600. Trypanosomes were present from time to time, once they were as high as one to every two white cells, but the most striking feature of the blood-picture was the high eosinophilia.

During the first month of treatment the fever was very marked, the trypanosome infection high, and there was no improvement in spite of atoxyl, 5 gr. injected every third day, and four subcutaneous injections of oxide of antimony. In the next two months the atoxyl was pushed, but there was no improvement; after this galy and antimony were given intravenously and steady improvement fol-

lowed. The galy was most effective when given well diluted 0.35 grm., the oxide in large doses (Martindale 1½ dr. or 0.15 grm.).

Tests of his hair in July showed abundant evidence of arsenic.

He was kept under treatment for a year then as out-patient, and finally allowed to leave London, sending weekly films; but each spring for the last four years I have given him a course of ten intravenous injections of tartar emetic, beginning with ½ gr. and going up to 1½ gr., once a week. Trypanosomes were last found in October, 1918. The case presents interesting features, the cyclical outbursts of trypanosomes about every fifth day attended by a definite rise of temperature and signs of toxic absorption (trypanolysin).

The polynuclear and eosinophilic curves moved generally inversely to one another, the former generally rising with the trypanosome curve, the lowest eosinophile count being at the time of the highest trypanosome count. The study of the parasites from day to day showed a variation in form in accordance with the curve of their incidence, in the early part of the rise they were slender, at the top they were longer and more robust with dividing forms, and on the third day with falling curve the slender forms predominated again.

Animal infection from the man was very difficult to start. With six white rats no definite infection was obtained, at least no trypanosomes could be found in them; of three guinea-pigs two became infected.

The following table shows the increase of the pathogenicity of the strain by passage:—

Trypanosome gambiense (Welsh).

			Died	Lived
(1)	Jumbo	5/6/16 first found	29/9/16	8/5/18 25 months
(2)	...	1/5/18	...	3/10/18 5 "
(3)	...	25/9/18	...	7/4/19 7 "
(4)	...	9/12/18	...	20/4/19 4½ "
(5)	...	22/4/19	...	22/7/19 3 "
(6)	...	22/7/19	...	10/1/20 5½ "
(7)	...	11/10/19 young	7/11/19	14/3/20 5 "
(8)	...	24/2/20	...	8/6/20 4½ "
(9)	...	8/6/20 young	8/7/20	20/9/20 3½ "
(10)	...	20/9/20	...	...
(11)	...	...	...	...

This patient was a pathological parasitic museum. He had quartan and subtertian malaria with relapses even while under intravenous arsenic and antimony treatment. He had frequent Calabar swellings with up to the present constant evidence of *Filaria diurna* in his blood. I removed a female *F. loa* from the skin of his chest which was the cause of his eosinophilia. From the same Campo River two other marines both showed a high eosinophilia but they had no trypanosomes, only *F. perstans*. An officer who had been working on the Victoria Nyanza shifting infected natives from place to place came for treatment. The diagnosis was difficult; he had fever, enlarged glands, irregular temperature, great depressions, and was very worried; but there was a definite syphilitic throat and he showed a positive Wassermann, so that I was able to re-

assure him, and he still remains quite well; of course many animal inoculations were negative, but unless monkeys are used this is uncertain.

In the long course of animal experiments the most striking feature is the extraordinary heavy infection of the blood which may be present without apparently inconveniencing the animal; in rats the spleen may extend right across the abdomen, and the lungs at death show patchy pneumonia, in the latter very great variations in forms of trypanosomes are found, many round and flagellate. In rabbits infection after intravenous inoculation is rapid and severe, paralysis of the hind legs with panophthalmia usually coming on near the end.

In guinea-pigs with my *gambiense* strain enormous enlargement of the spleen generally occurs; this may be like a soft bag of blood which becomes ruptured in a final convulsion, the peritoneum being full of blood. The guinea-pigs rarely show signs of distress until immediately before death.

Let us now visit in imagination a very beautiful island called Principe, on the West Coast of Africa, 100 miles from Fernando Po; it is only nine miles long and four miles broad, high inland with ravines and small rivers, there are many estates scattered about and one small town. This delightful place in 1820 was occupied by wealthy Portuguese residents and was worked by natives, the general health was good and no fly was present on the island; then, about 1825, with increasing prosperity more cattle and labourers were brought to the island, with them the so-called Gaboon-fly or tsetse-fly—the island also had become a depot for slaves. Up to 1900 the sting of the fly was regarded as harmless. So long as there were few natives from Angola the cases of sleeping sickness were rare, but in 1894 the disease had become widespread over the island. In 1912 an old post office official stated that he never for six months had been out before dark for fear of the fly which followed men about. Nothing was really done to remedy these conditions till 1912, when a commission was set up; with the hearty co-operation of the estate holders and the staff the island was practically cleared of fly, by drainage of marshes, regulating river beds, removal of much undergrowth, destruction of flies and larvae, with extermination of the wild pig on which the glossina fed. This, with isolation and treatment of human cases and prevention of any importation of new cases from the coast, showed that in small areas properly and systematically dealt with by experts the disease can be almost eradicated.

The mortality between 1902 and 1912 from sleeping sickness was 2,525, and many more cases were probably not registered; the population was only 8,800. In 1911 more than one-fifth of the total population was found to be infected. In 1914 the position is summarized thus: "It can hardly be supposed that a single living glossina remains on the island—none found in the last five months, and the only cases are those who have been previously inoculated with a period of latency exceeding one year. The trypanosome is the common dimorphic *T. gambiense*."

A large series of flies were collected and given to me, these were all *Glossina palpalis* except one *G. medicorum*, a very rare form.

This history reminds one of that of Mauritius, which for a long time was free from malaria, but the introduction of infective cases and the infecting mosquito soon rendered the island unhealthy and it remains so to this day. In Southern Africa there is still a very great difference of opinion as to what is the proper prophylactic measure to take. There are two schools: the first, who look upon the wild game of the district as the reservoir from which humans are infected; they would destroy all those in the neighbourhood of human habitation. The second, which consider this view not proven, are content chiefly to study the fly and methods of destroying them; and a third lot who wobble between the two; however, it is too wide a subject to treat on to-day.

Just a few words on treatment. Atoxyl was at first the sheet anchor and is now still very largely used by French medical men at the Pasteur Institute Hospitals, Paris. Dr. Louis Martin will always show you cases under treatment. Other forms of arsenic given intravenously have been largely used, but the British practice has almost entirely swung round to the preference of antimony given intravenously as tartar emetic $\frac{1}{2}$ -2½ gr.; enormous quantities have been given in cases generally without ill effects, but rather with good results.

Each case should, however, be treated on its own merits, carefully watching effects, pushing each drug as far as is safe.

THE TREATMENT OF HEPATIC ABSCESS WITH EMETINE.

By VINCENT S. HODSON, M.B., M.V.O.

Director Khartoum and Omdurman Civil Hospitals.

THE treatment generally recommended for hepatic abscess is incision and drainage, and as far as I can find medical treatment is not considered as in any way a substitute for the knife. I have had a number of cases which I have treated medically and which have appeared to be completely cured. Two of my cases which had ruptured through the lung recovered at once after the exhibition of emetine.

One of these, seen in 1917, had escaped detection and had been treated vaguely for hæmoptysis for some time as an out-patient. I gave emetine 1 gr., and told the patient to return the next day. She failed to do so, but I was able to get hold of her, and in spite of protests (as she imagined herself cured) I administered emetine 1 gr. on two consecutive days and told her to come back if she ever felt any pain in the liver. She returned in two months, and I gave her a second course of 3 gr. of emetine. She has had excellent health ever since. The last case I had operated on was admitted in February, 1920, and in due course the abscess was discovered, opened, and drained. This

case returned in September to have a re-accumulation opened and drained.

The following three cases have been under my care in 1920 and have been treated with emetine only, although there seemed no doubt that an abscess was present in each case.

Case 1.—The patient was a thin, muddy-complexioned youth, with a history of two months' illness, during which he complained of cough, fever, and pain over the lower part of the right chest. There was no history of dysentery, but patient was a very poor witness. Examination showed definite bulging over the liver with tenderness over the prominent area. The stools contained amœbæ and the eggs of *Hymenolepis nana*. Five days after admission the diagnosis was corrected from pulmonary tuberculosis to hepatic abscess, and emetine in 1 gr. doses was given for seven days. The immediate effect was to cause a slight rise of temperature, but also a marked improvement in health and appearance. The weight rose from 6 st. 5 lb. to 7 st. in about a fortnight, and the temperature remained normal or subnormal for twelve days before discharge. All local signs also entirely disappeared.

Case 2.—Patient had a history of dysentery 1½ months before admission and had since complained of pain and tenderness over the liver.

On admission there was acute tenderness behind the eighth rib, below and just internal to a line dropped from the right nipple. There was slight bulging of the side. The blood-count gave:—

Polymorphs	...	...	72.8 per cent.
Mononuclears	...	...	17.8 "
Lymphocytes	...	...	5.2 "
Transitionals	...	...	2.8 "
Eosinophile	...	...	1.4 "

The stools contained amœbæ and flagellates.

Emetine 1 gr. was begun at once and continued for six days. After five days' treatment heavy percussion was allowed over the place which, on admission, was almost too tender to touch.

The weight increased 14½ lb. in fourteen days, and when last seen patient appeared to be in perfect health.

Case 3.—Patient had had repeated attacks of fever dating back a year. She came to hospital complaining of pain in the right side and had a swelling in the hepatic area for about a month, during which period there had been some fever.

On examination there was great tenderness over the lower edge of the liver opposite the tenth costal cartilage where a smooth rounded mass was felt. There was no jaundice. There was also tenderness and bulging over the liver in the seventh, eighth and ninth intercostal spaces.

The upper level of the liver followed the sixth rib to the nipple line and then rose about an inch for a distance of 3 to 4 in. Emetine was given in doses of 1 gr. for six days after admission and was restarted on the twelfth day, when the upper surface of the liver was noted to be normal and the smooth rounded mass under the costal edge had

become more sharply defined. It had just a hard cirrhotic feel. The tenderness and prominence had quite disappeared and heavy percussion was allowed without a wince where the lightest tap had caused acute pain at the time of admission. On discharge, after nineteen days in hospital, it was possible to push well up between the liver and the ribs without causing any pain. Patient looked exceedingly well on discharge and her temperature was quite normal.

This method of treatment is not in accordance with that laid down in the latest edition of Manson's "Tropical Medicine," but I consider that the results obtained in (1) ruptured abscesses, (2) my three cases, justify the repetition of this treatment even though the amœbic hepatitis has proceeded to abscess formation. As is well known, the pus obtained from an amœbic abscess does not usually contain amœbæ for the first day or two because they are in among the cells which have not yet shredded off into the abscess cavity. Although there is no definite abscess wall, there is undoubtedly an attempt made to localize the abscess and to prevent absorption of its contents. Liver abscess cases are often afebrile for varying periods, and I find that the giving of emetine produces a reaction which is of use in confirming the diagnosis. If the amœbæ are killed, as seems to be the case when emetine is given, I see no reason why the contents of this peculiar type of abscess should not be absorbed.

I regard the reaction which so commonly takes place when emetine is given as marking the commencement of the absorption of these contents.

My own intention for the future is not to operate in cases of amœbic abscess until I have given emetine a really good trial.

WILD BIRDS A CAUSE OF THE SPREAD OF BILHARZIA INFECTION.

By F. G. Cawston, M.D. Cantab.

DURING the rainy season of the year it is exceedingly difficult to obtain fresh-water snails from the banks of South African rivers. All the maturer specimens are washed off the reeds and sink into the mud or are carried down-stream into the sea. There are two important means whereby the various species continue to survive, in spite of floods, which is one of Nature's methods of removing these evidences of stream-pollution. One is the formation of *overflow pools*, which are often found to be heavily infested with the various species of fresh-water snail with which the river-banks usually are infested. Another is wild-bird life. Many wild birds that are seen along the banks of rivers, particularly among the reeds, carry in the mud attached to their claws numerous minute snails and the eggs of snails which have become attached to their claws whilst they are drinking water from the river. Numbers of these will reach the shallow water of some pool that the

bird visits before the mud has had time to become quite dry, and, as the mud is washed away from the claw of the bird, will soon reach maturity in their new surroundings. In four months I have developed from eggs under artificial surroundings *Physopsis africana* 12 mm. in length. In nature this intermediate host of the bilharzia probably grows more rapidly, but I have found bilharzia infestation in a specimen of this size.

Wild birds must therefore be held responsible for the spread of much infection, and I always find their haunts promising places for finding fresh-water snails at all stages of development. It would appear that wild birds are incapable of devouring as many fresh-water snails as they themselves carry in the mud attached to their claws.

In erecting a dam along the course of a river we are interfering with Nature's own attempts at ridding a river of pollutions. Such artificial collections of water are some of the best hunting-grounds for fresh-water snails and other evidences of stream-pollution.

Not only so, but fully developed snails which, under natural conditions, would have been washed down stream are to be found in large numbers attached to the dam-wall or to the numerous rushes which grow particularly profusely near the dams.

As the stagnation increases the natural food-supply of fish is materially interfered with, and those fish which to a greater or less extent feed upon fresh-water snails find it impossible to survive.

In approaching the problem of bilharzia prophylaxis, it is well to bear these facts clearly in mind and to direct our attention primarily to those collections of water where fresh-water snails tend to breed in large numbers.

A few domesticated duck will soon clear a dam of fresh-water snails. As these birds do not fly from place to place they are incapable of introducing new specimens to take the place of those they devour. Since August last, when an Indian introduced three white duck on to his pool at Sydenham, this pool has remained clear of fresh-water snails, though Dr. Annie Porter and myself collected 350 there one afternoon in the August of the preceding year. Nor have these duck been stolen as was feared and has been used as a reason for not introducing domesticated duck on to the dams of infested rivers.

Quite sufficient wild birds are protected by the Mosaic Law without adding to the list those which aid in the spread of bilharzia infection by carrying fresh-water snails from pool to pool, and yet "a minute has been sent by the Public Health Department to the various provincial administrations drawing attention to the desirability of protecting wild birds which prey upon fresh-water snails as a prophylactic measure against bilharziasis. The various species of duck are mentioned as most useful in this connection; others being black stork, marabou, wood ibis, hammerkop, paddevanger, mudlark, greater and lesser flamingoes, geese, rails, crakes, moorhens, reed hens, red-knobbed

coot, Peter's finfoot, red and green shanks, sandpipers, ruffs, knots, stints and snipes."

I have recently observed that, not only do the little fish called "millions" keep collections of water free from the cercariae of bilharzia and liver-fluke disease, but make it impossible to breed fresh-water snails in any numbers. I have two collections of water side by side containing appropriate green food for snails. The one that contains "millions" is almost entirely free from snails, whilst the other which contains no "millions" swarms with snails, though I placed an equal number of young snails and snails' eggs in both a few months ago. Further than that, I have noticed one of these small fish nibble at one of the living snails.

Both domesticated duck and "millions" can be safely recommended to keep down bilharzia infection; but wild birds will continue to do more harm than the good they may do by devouring fresh-water snails.

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THE examination result of the sixty-fifth session, January-April, 1921, has been issued as follows:—

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Passed.—J. M. Wallace, M.R.C.S., L.R.C.P.; J. Segal, M.D. (Paris); O. M. Banhawry (Lie. of Egyptian School of Medicine); D. N. Gore, M.B., B.S. (Bombay), D.P.H. (Lond.); P. Parthasarathy, L.R.C.P. & S.E., L.M.S. (Madras) (Mysore State Service); M. Morrison, M.B., Ch.B. (Edin.) (West African Medical Service); L. M. Sen, M.B. (Calcutta); B. K. Ray, M.B. (Calcutta); J. C. Rowan, L. & L.M., R.S.S. & P. I.; H. Smith, M.R.C.S., L.R.C.P.; Miss A. Shaw, M.B. (Calcutta); D. S. Scott, M.B., Ch.B. (Aber.) (Tanganyika Territory); R. A. W. Procter, M.R.C.S., L.R.C.P.; Miss A. M. Mackay, M.B., Ch.B. (Edin.); J. C. Coetzee, M.B., B.Ch. (Dub.); K. A. Gandhi, M.B., B.S. (Bombay), D.P.H. (Lond.) (Bombay Prov. Ser.); C. L. Sahni, M.B., B.S. (Lahore); N. S. Kotwall, M.B., B.S. (Bombay), D.P.H. (Lond.); F. X. Costello, L.R.C.P. & S.I., L.D.S.I.; K. C. Cheng, M.B., B.S. (Hong-Kong); S. Miller, M.B., B.Ch. (Belfast); Surg. Lieut.-Commander P. N. Button, M.R.C.S., L.R.C.P. (Royal Navy); Miss M. Jervis, L.M. & S. (Bombay); A. R. McLean, M.B., Ch.B. (Edin.); Miss L. J. Murphy, M.B., B.Ch. (Dub.) (F.M.S. Medical Service); A. R. Jennings, M.B., B.Ch.; Miss M. J. Ahern, L.R.C.P. & S.I. (F.M.S. Medical Service).

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APRIL 15, 1921.

THE DEVELOPMENT OF A MEDICAL PROFESSION IN CHINA.

THE recent address delivered at the Royal Society of Medicine, London, by Dr. Harold Balme, F.R.C.S.(Eng.), of the School of Medicine, Shantung Christian University, Tsinan, Shantung.

China, brought home to a large audience of doctors and others the admirable work the missionary societies are doing in China in promoting modern medicine in that country. His address was published in that useful journal, *The East and the West*. Dr. Balme gave an interesting account of the introduction and the advance of Western medicine in China, and the information he gave is well worthy of being carefully preserved as an historical document of value in the relations of Great Britain and China.

We should have been pleased to print the whole paper, but space compels us to curtail the excellent address. Dr. Balme points out the impossibility of presenting Western medicine in anything but an empirical manner until European medicine was itself established on a sure and scientific foundation. A hundred years ago Europe had but little to teach China, but the rapid advance of medicine, surgery and hygiene in Europe and America have equipped us to teach other peoples amongst whom empirical medicine is the only knowledge they possessed. In earlier times China in many ways actually led the van in medicine. Seven hundred years before the value of inoculation as a preventive against small-pox was recognized in Europe, it was freely practised by Chinese physicians; whilst the uses of mercury, of arsenic, of rhubarb, and of various other medicaments have been known and appreciated from time immemorial in the Flowery Land.

But the application of the basic sciences to medicine never reached China, and even so fundamental a physiological fact as the circulation of the blood does not seem to have been even guessed at by the old Chinese practitioners. The lack of facilities for dissection necessarily resulted in the most erroneous ideas becoming current as to what took place within the human body, whilst the absence of any system of medical education, or of restrictive regulations regarding the practice of medicine, made the widespread exploitation of the profession not only possible, but inevitable. Any one who wished to do so could hang up his sign and call himself a doctor, and no authority could prevent the most reckless adventurer from preying upon the credulity of the public.

It was amidst conditions such as these that the first practitioners of Western medicine commenced their work amongst the Chinese, led by Thomas Richardson Colledge, a surgeon attached to the East India Company, and Peter Parker, the first appointed medical missionary to China.

It was in 1834 that Peter Parker first landed in Canton, and within three years of that time we find him starting to train his first class of medical assistants, one of whom, Dr. Kwan-tao, afterwards obtained a reputation as surgeon and oculist which threatened to rival that of his teacher himself. From that time onward similar classes were organized wherever mission hospitals were established, whilst one of the first medical missionaries sent out from England to China, Benjamin Hobson,

set himself to the difficult task of translating some of the leading medical text-books into Chinese.

Work of this nature continued for the next fifty years, but it was not until 1881 that the first attempt was made to organize a proper medical school for the Chinese. This was due to the joint efforts of Dr. Kenneth Mackenzie and Li Hung Chang, the great Confucian official and viceroy. It was naturally a somewhat rudimentary effort, but it laid the foundations for the remarkable advance which medical education has made in China during the last decade.

Prior to the Boxer rebellion modest efforts in this direction had already been commenced in one or two centres, notably by Dr. Mary Fulton, who was already beginning to build up a medical school for women in Canton and at Shanghai. It was the Union Medical College at Peking, established through the successful labours of Dr. Thomas Cochrane, and with the patronage and financial support of the Dowager Empress and many of the leading Chinese officials, which was the first missionary medical college to be set up in China on a union basis, and with a fairly adequate staff and equipment. This college secured from the outset the recognition of the Chinese Government, and was fortunate in obtaining the services of such men as Wenham and Gibb of St. Bartholomew's, Stenhouse of the London Hospital, and Hall of the United States—men to whom China owes an immense debt of gratitude.

With Peking's successful example as a stimulus, other missionary medical colleges were rapidly developed in other parts of China—in Shanghai and Hankow, in Moukden and Tsinan, in Hangchow and Nanking, in Changsha and Chengtu, in Foochow and Canton, &c., and two medical schools for women were also established in Peking and Soochow. All these colleges set out to offer a full course of medical training, but it was found impossible to face the tremendous drain upon Church resources which the maintenance of so many schools would entail, and the institutions were therefore faced with two alternatives, either to reduce their number, or frankly to content themselves with a type of medical education that was admittedly much below modern standards.

In the course of a few years, however, a completely new situation began to develop. In the first place, there came into existence a body of Chinese medical men who had received their medical training on modern lines, mostly in Europe and America, and who subsequently formed themselves into a National Medical Association of China. The leaders of this group, headed by Dr. Wu Lien-teh, lost no time in petitioning the Government for the establishment of modern standards of medical education, and publicly stated that they would rather see fewer practitioners of modern medicine with high ideals than a number of inadequately trained men and women. In the second place, certain organizations unconnected with missionary work, but keenly interested in the progress of China,

also began to take a share in the work of medical education. A College of Medicine, with which the well-known names of Sir Patrick Manson and Sir James Cantlie were connected, was founded in Hong-Kong as far back as 1887, and has now become the Medical Department of Hong-Kong University. Prior to the war the Germans, aided by a large Government subsidy, started a well-staffed medical college in Shanghai and Tsingtao. A similar institution, with excellent equipment and under the leadership of a large group of medical experts, has been set up in Moukden by the Japanese. Finally, the Rockefeller Foundation of New York sent out an influential commission to China in the year 1914, and as a result of their recommendations have established a new organization—the China Medical Board—for the purpose of developing medical education on the highest possible standards in China.

It was in accordance with this view that one of the first things which the Council on Medical Education of the China Medical Missionary Association did was to recommend that in addition to the School at Peking, which the China Medical Board had taken over, and which it had decided to place on an English basis (English being used instead of Chinese as the medium of instruction), the Board should also be asked to assist in the development of at least one school in which teaching was given in the Chinese language. They further recommended that the medical school best suited for such development was the one situated at Tsinan, the capital of the province of Shantung. They subsequently urged that all missions interested in the advance of medical education, through the medium of Chinese, in the great Mandarin-speaking area of East and Central China (that is to say, apart from Manchuria and West China) should concentrate their forces in the development and support of this school.

This has been one of the most remarkable instances of missionary co-operation yet seen in China, for it brought no less than nine missionary societies into association. It has had the very satisfactory result of enabling the School to secure a large faculty, representing some of the leading universities and hospitals in Great Britain and North America; of obtaining an expert staff for the teaching of the various subjects in the curriculum.

The China Medical Board has already shown its interest in this new development by transferring to the Tsinan School three of the classes of students formerly under instruction in Peking, and in making a most generous grant for the provision of further buildings and equipment and the salary of additional teachers.

It is not, however, in medical education alone that such progress is being seen. Great and important strides have been taken in the direction of creating a scientific literature in the Chinese language, and one of the most important departments in the Tsinan Medical School is that which is devoted to this work. This is a branch of the

translation and publication work of the China Medical Missionary Association, which has done so much to prepare a scientific vocabulary in China. Several medical missionaries, notably Dr. Cousland, Dr. Gillison and Dr. McAll, are giving their whole time to this work, and are making a most important contribution to the building up of the new medical profession.

Meantime a sister profession has come into being, and to-day every medical man in China is welcoming the advent of the trained Chinese nurse. A large number of the leading mission hospitals are now regarding the training of Christian nurses as one of their most important tasks; and here also one is glad to be able to report that modern standards are being introduced throughout the country. A Nurses' Association has been formed, consisting of graduate nurses, both Chinese and foreign, and this Association has inaugurated an excellent nursing curriculum, extending over four years, and a series of standard examinations which all registered training schools must adopt before its nurses can receive the diploma of the Association.

The vast importance of preventive medicine in the uplift of China is similarly being kept to the front, and there is no subject in which the modern Chinese are more intensely interested. The subject of hygiene is taught in every school to-day, and great health exhibitions, attended by enormous crowds, are constantly organized in the leading cities. Dr. W. W. Peter, with his able assistant, Dr. Woo, are giving themselves up entirely to this work, and an influential council on health education, upon which various bodies are represented, is constantly initiating new methods of bringing before the Chinese those important facts which enter so largely into the fight for health.

Annotations.

Nocardiosis Cutis Resembling Sporotrichosis (W. H. Guy, *Arch. of Derm. and Syph.*, vol. ii, No. 2, 1920).—The case occurred in a man, aged 50 years, a coal-miner. The lesions were of an inflammatory type, they began as small papulopustules, and developed into indurated ulcerations with a granulating fundus.

From a soft unbroken lesion, a nocardia-like fungus was isolated which on agar, after forty-eight hours at room temperature, grew in the form of greyish-white pin-head-sized cultures, dense at the centre, with a fine radiating fringe. Microscopically the culture was found to consist of a mass of tangled branching threads and small roundish granules.

The Mycelial and other Micro-organisms associated with Human Actinomycosis (Leonard Colebrook, M.B., B.S.Lond., *British Journal of Experimental Pathology*, August, 1920).—The author applies the term actinomycosis to any suppurative

condition, the pus of which contains granules visible to the naked eye, composed of a feltwork of filamentous micro-organisms.

To verify mycelial structure a granule may be lightly crushed under a cover-glass and examined unstained; for a more detailed examination the granule may be thoroughly crushed and stained by Gram and then stained again with weak carbol fuchsin.

Cultures may be obtained by taking several granules which are washed in sterile water to get rid of contaminating bacteria, and crushing them in a drop of fluid between two sterile microscope slides; the culture methods are (1) glucose-agar plates incubated anaerobically by the palladium chloride method; (2) by pouring inoculated agar into a narrow test-tube and covering the top of the column with a layer of liquid vaseline or paraffin; (3) Dr. Mervyn Gordon's method of planting a granule in a tube of blood broth under oil.

The author summarizes the first part of his paper as follows:—

(1) Cultures of mycelial organisms were obtained from the granules of twenty-four cases of human actinomycosis; twenty-one of the twenty-four strains conformed in their general characteristics to the anaerobic type described by Wolff and Israel (*Actinomyces bovis*), and later, in greater detail, by Homer Wright; two strains were also anaerobic but with slightly different cultural characters, and one was quite different—aerobic.

(2) All strains of *A. bovis* which were tested showed coarse agglutination with the serum of heavily infected patients. The serum of rabbits inoculated with the organism also gave a strong agglutination reaction.

(3) The current hypothesis that actinomycosis is directly conveyed to man from vegetable sources or from the soil is held to be probably false. Certain evidence is put forward which suggests that the organism is a common inhabitant of the human alimentary tract.

The second part of the paper deals with certain bacteria commonly found in close association with actinomycetes. Actinomycotic granules are usually surrounded by an envelope of thickly-packed leucocytes; if these leucocytes are washed away, and the granule stained by Gram's method and counterstained with weak carbol fuchsin, it will be seen that the Gram-positive mycelium is set on a background, which takes the counterstain and appears as a pink or red blur. This background is a densely compacted sheet of very minute Gram-negative cocco-bacilli, the separate organisms may be made out at the edge of the sheet, or where it is broken.

The organism is minute and may have the form of a micrococcus, diameter 0.3 to 0.5 micron, or a very short cocco-bacillus 0.8 to 1.5 micron long. It is non-capsulated and non-motile. In cultures it grows aerobically and anaerobically on ordinary nutrient agar, glucose-agar, or blood-agar; the colonies are small, very adherent to the media, and very difficult to break up. Weak carbol fuchsin

must be used as a counterstain as the organism does not stain with neutral red.

In 80 per cent. of the cases these organisms have been at some period of the disease, and in about a dozen instances they have been cultivated on artificial media. They are of unfamiliar type, and have not been met with in any other circumstances, so far as is known. It was proposed by Klinger, who reported the cultivation of similar organisms from four cases of actinomycosis in 1912, to apply to them the name of *B. actinomycetum comitans*.

Abstracts and Reprints.

DIAGNOSIS AND TREATMENT OF RECURRENT CHOLECYSTITIS WITHOUT STONES.¹

By MAX EINHORN, M.D., New York.

THE last two or three years have given us frequent opportunity to deal with gall-bladder and inflammations without stones in which the diagnosis, as well as the treatment, presented a rather difficult problem. Although some surgeons, notably the Mayos, Dr. R. S. Fowler, of Brooklyn, and John B. Deaver, of Philadelphia, excise the gall-bladder when chronically inflamed, the majority of clinicians, and not a few surgeons, doubt the advisability of extirpating a gall-bladder—even if diseased—so long as it does not contain stones. Inasmuch as our opinion is contrary to this commonly held view, we thought it best to present our experience regarding this subject before you.

In looking over the cases, with regard to their symptomatology, two types can be easily discerned. Type 1 is characterized by distinct attacks of colicky pains in the upper abdomen (usually on the right side or exceptionally on the left side), lasting from one to several days, followed by perfect relief of symptoms. One or more such attacks will have occurred before the patient consults his physician. During the attack there is often a slight rise in temperature, accompanied by a moderate leucocytosis and an increase of the polymorphonuclear white blood cells.

Type 2 shows no distinct attacks. The patient usually complains of slight distress either in the midepigastrium, especially after meals, or somewhat to the right of the linea alba covering, principally the right hypochondriac region. While there is usually no rise in temperature, at times the latter may occur in a pronounced manner. The patient is then debilitated and bedridden.

In both types the objective findings are as follows:—

The liver is frequently found somewhat enlarged. Palpitation to the right of the linea alba in the area situated between the costal margin and the navel line occasionally elicits pain, especially during an inspiration. In the same region there is at times found the *défense musculaire* of the *rectus abdominis* muscle.

The bile, as found by aspiration of the duodenal contents in the fasting condition of the patient, is usually turbid, presenting a yellow-brownish appearance. Occasionally it looks greenish. Microscopically numerous bacteria and cocci are frequently found; often pus cells. Cholesterolin and bilirubin-calcium crystals are likewise encountered, but in comparatively small numbers. The alkalinity and the pancreatic ferments do not, as a rule, deviate much from the normal.

In quite a number of these patients the appendix was found to be considerably diseased. In every one of the patients (excepting a few who had undergone appendectomy before) the appendix was removed as a prophylactic measure. A few of the cases were complicated with peptic ulcers, requiring special treatment for the latter affection.

At the operation the gall-bladder, as stated above, was thoroughly examined by inspection, palpation, and aspiration. In all the cases mentioned it was found diseased—either thickened or glistening whitish, or the bile was dark black and turbid or containing much mucus and slightly thickened material. The pathological anatomical diagnosis, as given by the pathologist of the hospital, is stated in each case examined. The gall-bladder was always found diseased, and the diagnosis of cholecystitis corroborated.

DIAGNOSIS.

The recognition of chronic cholecystitis without stones is not difficult. In making a diagnosis, however, in most instances, merely the cholecystitis can be made out, while the absence of stones cannot be foretold until after the operation. According to Smithies, even in distinct cases of biliary colic, stones are found in 57 per cent., while in 43 per cent. no calculi are present. In exceptional cases the probable occurrence of a cholecystitis without stones can be predicted.

The diagnosis of cholecystitis is based upon the symptoms (colicky pains in the upper abdomen; distress in the epigastrium radiating backward to the right) in conjunction with the presence of pronounced turbid bile in the duodenum in the fasting condition of the patient, as found by means of the duodenal tube. The existence of a considerable leucocytosis, with an increase of the polynuclear elements, enhance the diagnosis and indicates the severity of the lesion.

TREATMENT.

Mild cases of cholecystitis yield often to medical treatment. The same consists of ample rest, frequent small meals, plenty of water, saline aperients (Carlsbad, Saratoga, French Lick Springs), washing of the duodenum with a weak argyrol or ichthyol solution (1 to 2 per cent.).

Frequently recurring attacks of cholecystitis, especially when accompanied by even a slight rise of temperature, require operative intervention. The same applies to forms of cholecystitis throwing the patient into a state of invalidism or endangering life by infection. The operation consists in removing the offending organ (cholecystectomy).

¹ Abstracted from *Medical Record*, August 7, 1920.

THE REASONS FOR AND THE RESULTS OF THE OPERATION.

The reasons for the operation in the cases described were: (1) Recurrent troubles not yielding to the usual modes of treatment. (2) Febrile conditions bearing the stamp of infection, and apparently due to the gall-bladder, endangering life.

The results were uniformly good, excepting in one case, in which recurring attacks of jaundice and cholecystitis persisted after the operation.

SCURVY IN THE WORLD WAR.¹

By ALFRED F. HESS, M.D., New York.

THE greatest advance in medicine during the past generation has been in the fields of hygiene and preventive medicine. One might therefore have expected that the World War would have differed from previous wars in a notable absence of scurvy among the troops and the civilian population. This is true to a limited degree only. Reports which have been published in the course of the war, and especially since hostilities have ceased, have shown that the number of troops who were incapacitated by scurvy must have reached many thousands. As was to be expected, scurvy occurred most often in Russia, where it is endemic. The largest number of cases was reported by Boerich, who as director of a Red Cross central station in Russia saw 1,343 cases. Other German physicians who had charge of caring for the Russian prisoners give accounts of the occurrence of some hundreds of cases. An article by Much and Baumbach gains added interest from the novel suggestion that scurvy is transmitted by means of vermin. That scurvy must have reached large proportions is shown by the fact that in July, 1916, a medical commission was sent by the Germans to investigate the scurvy in a Russian army corps, and that it was necessary to establish for scurvy in every division a sanatorium comprising 100 beds. Hoerschelmann, who wrote an account of this investigation, blames the bad hygienic surroundings, the lack of sleep, the over-exertion, as well as the deficiency of food, for the occurrence of the epidemic. It is interesting to note that he relates a number of cases where scurvy was feigned by rubbing the gums to make them bleed, or by irritating them with the juice of tobacco. These reports on scurvy in Russia bring us little new from a purely medical standpoint. They emphasize the occurrence of night-blindness as an early and frequent symptom. Whether this manifestation was due entirely to the scurvy or was in part the result of other deficiencies in the diet, is difficult to judge. For instance, Hift states that the night-blindness was cured by cod-liver oil, or by the water in which beef liver had been cooked. This would point rather to the deficiency of the fat-soluble vitamins, as these substances could have little effect

in curing scurvy. The cases reported by Wassermann, where neuritic pains in the legs played a considerable rôle, evidently are also not simple cases of scurvy, but may well be the result of more than one food deficiency or a complicating osteitis. In the same way some reports show clearly that "hunger œdema" complicated scurvy.

Scurvy occurred next in frequency among the nations neighbouring Russia. Speyer tells us that a German sanitary commission was sent to Bulgaria largely with the object of investigating scurvy in that country. The excellent monograph on the pathology of scurvy just written by Aschoff and Koch was founded on an experience in Roumania among Turkish, German and Austrian soldiers. Added to its other woes the Serbian army was visited by scurvy. Wiltshire gives us a description of this disease based on the observation of 3,000 cases in the first half year of 1917. Regarding scurvy in this part of the world, Morawitz writes that when he reached Roumania he was surprised to find scurvy the most prevalent disease in the army, and that since the spring of 1917 it was widely disseminated among the German troops. Lobmeyer writes of scurvy among the Turkish troops, and Disqué reports 500 cases among prisoners captured in Turkestan.

Along the Western front very few cases are described. There is an account by Korbseh of fifty-one cases in this area in 1915. Schreiber describes thirty cases among the German prisoners of war captured in the beginning of 1917, which were diagnosed as purpuric rheumatism. Arneith tells us that sporadic cases of scurvy occurred among the German troops, especially among the older soldiers, and that in many cases this was combined with the hunger œdema. He attributes the scurvy to a dependence on dehydrated vegetables in the ration.

From all these accounts it is evident that scurvy played an important rôle in the general nutrition of the troops on the Eastern front. Probably it was of the latent variety which is exceedingly difficult to diagnose, but which increases the susceptibility to infection and intensifies the severity of all medical or surgical diseases. Von Niedner takes this point of view, stating that, although scurvy had been largely prevented in this war, the obscure rudimentary type had not been eradicated. He remarks upon the fact, noted in our Civil War and other wars, that under these conditions eruptions assume a hæmorrhagic character in typhoid fever, cerebro-spinal fever, rheumatism and other infections.

Pick made a similar observation at a medical meeting in Vienna in reference to scurvy in the Austrian army, drawing attention to the hæmorrhagic diathesis existing among the troops and expressing the opinion that scurvy was occurring in this war as in previous wars.

Very little scurvy seems to have broken out among the British troops in Europe. Thirty-two cases were reported as occurring in the middle of 1915 at a divisional rest station in France. It made marked inroads, however, on the health of the colonial troops in Mesopotamia. In the report of the Mesopotamia Commission we read that 7,500 men were lost to the

¹ Abstracted from the *International Journal of Public Health*, vol. i, No. 3, November, 1920.

force in nineteen weeks as the result of scurvy, and that this happened in the summer of 1916, although new additions had been made to the ration in the previous spring. A conception of the extent of the scurvy may be formed from the accompanying table, published by Willcox:

	Scurvy (Indians)	Beriberi (British)
1916 (July 1 to December 31) ..	11,445	104
1917	2,199	84
1918	826	51

It will be noted that the great majority of the cases occurred among the Indian troops. This was due to the fact that the British ate more potatoes and fresh meat. In his official report of the outbreak of scurvy among Indian troops, Colonel Hehir writes: "The only vegetable now allowed is 2 oz. of potatoes, and the only fresh meat 28 oz. a week. It is very doubtful whether this authorized ration, if not supplemented by other vegetables and more meat, is sufficient to prevent scurvy." In the account which this officer gives of the medical conditions during the siege of Kut-el-Amara, it is stated that there were 1,050 admissions for scurvy, fully developed, incipient and latent. It is remarked that the Indians who ate horseflesh were decidedly less affected. From the fact that special hospitals for scurvy were established in June, 1916, at Bagdad, Amora and Basrah, it is evident that a large number of cases must have been encountered. Most significant in this connection, however, are the preventive measures which were instituted by the British Government. A body of 256 men, designated as the Madras Gardeners Corps, were dispatched to Mesopotamia to plant gardens all over the country and to supply packets of seeds to various units. At Bagdad alone their output of vegetables was over 400,000 lb. This certainly constitutes a remarkable innovation in the hygiene of armies.

The French army was not entirely spared from scurvy. In 1917, Harvier, an army surgeon, was surprised to discover that 95 per cent. of the 800 troops of which he had charge suffered from scurvy; he tells us that other epidemic centres were recognized later outside this sector. Elsewhere we read of the occurrence of scurvy in France, involving 40 per cent. of the 1,700 men of the South African Labour Corps, and that this disorder was still more serious in another company owing to the fact that it was not recognized. Benoit reported sixty-three cases which he discovered in 1917 among 300 labourers. According to his account, all these labourers received the same food, and those with scurvy recovered quite independent of any change in the dietary.

There are many accounts of scurvy among the Italian troops. Vannutelli gives a description of an epidemic of some 200 cases of infectious purpura with manifestations of hæmorrhagic scurvy. Another writer informs us that in June, 1916, scurvy broke out at an altitude of 1,500 to 2,000 metres. Vallardi gives an account of 180 cases among Italian troops in Macedonia, accompanied by slight jaundice and enlargement of the glands.

The American soldiers seemed to have been practically spared from scurvy. This was due probably to

their ample ration and to the fact that they were in the field a comparatively short time. The Surgeon-General's report to date, which has been kindly furnished me, showed but five cases in 1917 occurring in Europe and the United States, and but fifteen cases reported during the year of 1918.

The civilian population of the various warring countries was by no means spared. There are no reports from Russia to indicate the extent of scurvy, but from what we know of the food conditions prevailing there toward the end of the war, we can be certain that the number must have been large. The greatest amount of scurvy of which we have information occurred in Austria, more particularly in Vienna. Previous to the war scurvy was a rare disease in this city, both among adults and infants. During the war, however, as the result of a lack of fresh food and the dependence on dehydrated vegetables, a large number of cases developed. Tobler reports over 200 cases in children between the ages of two and fifteen years, which occurred in 1917 in child-caring institutions where the milk supply was markedly deficient, where fresh vegetables were lacking, and the supply of potatoes gave out about Christmas, 1916. A conception of the deficiency of the milk supply may be gained from a statement that there was but 16 quarts a day for about 1,500 people. Some of these children were undergoing a fresh air treatment, and were out of doors in the "sun stations" day and night. For the cure of these children a simple decoction of fir-tops was used, a therapeutic procedure stated by Lind to have been of value in the Russo-Swedish War of 1708.

That scurvy must have occurred extensively among the infants in Vienna may be gathered from the report of Erdheim, who records thirty-one autopsies on infants under the interesting title of the "Barlow-Heart." In Berlin scurvy occurred also in the foundling asylum, as reported by Eric Muller and by Brandt. This was brought about by a diet of pasteurized milk and dehydrated vegetables. In an article bearing the suggestive title, "On a marked increase in Barlow's disease in the years of the War, 1917-18," Epstein states that in Prague they had been having an endemic increase of infantile scurvy since August, 1917. The only information regarding scurvy among the adult population of Germany is that of Morawitz, who states that this disorder occurred sporadically. Here again it is probable that there were many latent cases or rudimentary cases which were not recognized.

In Great Britain there were reports which show that scurvy manifested itself in institutions caring for the poor. In Glasgow we learn of fifty cases developing in the Poor Law Hospital in the course of fifteen months, and in Newcastle of sixteen cases appearing in the Poor Law Infirmary in the course of three months.

It is probable that when we receive more detailed reports we will find that there was far more scurvy than was appreciated during the war. We shall never, however, gain even an approximate knowledge of the extent to which this disorder prevailed, as in many instances it was inextricably interwoven with other nutritional diseases. The situation which Enright describes in Cairo among the Turkish prisoners suffering

from war œdema, where there was "evidently a scorbutic factor involved," probably held true for many parts of the world. We must still regard war and scurvy as associated evils, for war is closely linked with famine and food deprivation—the dominant factor in the production of scurvy.

STUDIES ON ROCKY MOUNTAIN SPOTTED FEVER.¹

By S. BURT WOLBACH.
Boston.

RICKETTS and his associates were the first to show the hereditary transmission of the virus in ticks. I have been able to verify the presence of the virus in the eggs of ticks, and to demonstrate the parasite morphologically in ova and in spermatozoa from ticks. The susceptibility of the small mammals of the Rocky Mountain States and the finding of immune animals have been shown by Ricketts and McClintic. It seems reasonable to suppose that alternation between mammals and ticks occurs frequently. On the other hand, it seems probable that the virus may be maintained in many generations of ticks without introduction from a mammalian source, but that this may last indefinitely cannot be assumed. J. L. Todd has found that the spirochæte of African relapsing fever eventually disappears from *Onithodorus*. (Personal communication.) The existence of local foci of infection would indicate that hereditary transmission of the virus in ticks is an important factor in maintaining the virus in nature. The tick does not travel great distances except when attached. The range of the small mammals on which the larval or nymph stage feed is restricted, and therefore the carrying of infected ticks from locality to locality can only be accomplished by the larger animals. As the adults engorge in the early spring months on range animals, this probably does not play a very important part in the dissemination of the ticks. Engorged females, on dropping, seek cover, and deposit their eggs wherever chance has placed them. Engorged females dropping from cattle in transport must rarely find conditions suitable for the hatching and rearing of the larvæ.

These factors must tend to retard the extension of the areas occupied by infected ticks. The sudden appearance of the disease in eastern Montana in 1915 can best be explained by the introduction of infected ticks upon transported animals. The movements of animals with the disease could hardly account for such a wide extension. Human cases may be disregarded as a source of the virus, because of the relatively small number of individuals acting as hosts, and because patients with the disease are not accessible to ticks, while ticks attached to their persons are almost invariably destroyed.

Mammalian "carriers" of the disease have not been discovered. In all experimental animals the blood ceases to be infective after the subsidence of fever. It is, however, permissible on theoretical grounds to consider the possibility of the disease existing in a chronic form in some of the wild mammals which are hosts to the tick.

The question of the consistent difference in virulence of the disease in man in different districts is impossible of explanation, and its study requires extensive investigation into the duration of infectivity and character of the disease in all animals acting as tick hosts. Rapidly repeated passages of the virus during a long period in a single species of animal peculiar to, or particularly abundant in, a given locality, would, conceivably, modify the virulence for man. For this reason a careful study of the disease in rabbits in relation to the lower mortality of the disease in man in eastern Montana, as compared with the mortality in western Montana, is highly desirable. Parker has shown that the rabbit acts as host to all stages of the tick, a fact which proves the possibility of more numerous passages of the virus through this animal.

The susceptibility of the larger animals, horses, cattle and sheep, to the disease, has received but scant attention and requires investigation. The finding of infective ticks upon the mountain goat suggests another much needed line of research. The possibilities of an immune therapy necessarily lie in the discovery of a large-sized susceptible animal.

Rocky Mountain spotted fever as a disease assumes new interest and importance now that its nature is known. The remarkable specificity of the parasite for the peripheral blood-vessels in all experimental animals and in man is of significance in relation to the number of transmission.

The lesions of the blood-vessels are due to the presence of the parasite and constitute the distinctive pathology of the disease, and warrant the definition—"An acute specific infectious endangitis, chiefly of the peripheral blood-vessels . . ."—which I have given. The character and evolution of the rash with the cutaneous sequelæ (necrosis or gangrene) are explained by the blood-vessel lesions. The hyperæsthesia and probably the restlessness of the patients are explained by the secondary involvement of nerves in the inflammatory reaction surrounding blood-vessels with lesions.

The lesions are at first essentially proliferative (endothelium), followed by necrosis of small groups of cells, and the chief cellular reaction, both locally in response to the presence of the parasite, and in general, presumably in response to toxins, is endothelial. The respiratory symptoms may be due in part to a central action of toxins, but it is also reasonable to ascribe some effect to the accumulation of endothelial cells in the pulmonary capillaries.

The icterus is due to red blood corpuscle destruction, and as no evidence of an intracorporeal stage of the parasite can be obtained, is probably of toxic origin. Fused masses of red corpuscles in the spleen are probably a stage preliminary to their

¹ Abstracted from *Journal of Medical Research*, vol. xli, pp. 1-197.

destruction, an assumption which is further supported by the accumulation of hæmosiderin in endothelial cells. Evidence of bile stasis in the liver is completely lacking in all varieties of material studied.

There are two diseases which clinically have a strong resemblance to Rocky Mountain spotted fever, and which will probably eventually be classified in a group, the chief characteristics of which are included in my definition of Rocky Mountain spotted fever. These diseases are typhus fever and tsutsugamushi disease, or Japanese river fever or flood fever; a brief comparison of each with Rocky Mountain spotted fever follows.

Typhus Fever and Rocky Mountain Spotted Fever.—Typhus fever, of all diseases, is most like Rocky Mountain spotted fever, and if the two should exist at the same time in the same community a differential diagnosis without animal inoculation would be impossible. The course of the two diseases and the characteristics of the rash in each are almost identical. Like the virus of Rocky Mountain spotted fever, that of typhus is not filterable, and Nicolle and Blaizot find indications of the same susceptibility to physical agents, for they find that the virus of typhus will survive but six days on ice and but two days at 37° C.

The pathological anatomy of typhus is not distinctive. The spleen is not uniformly enlarged as in spotted fever. The histology of the skin lesions has been described recently by a number of authors, and resembles in many respects that of spotted fever.

There are a few clinical differences which may be mentioned here. Typhus fever is transmitted by the body louse. The incubation period is longer than in the case of Rocky Mountain spotted fever, usually about twelve days. The rash makes its appearance on the chest and shoulders and extends over the trunk, before appearing on the arms and legs, in almost the reverse order of the rash in Rocky Mountain spotted fever. In typhus, enlargement of the spleen is absent or less marked than in spotted fever. Icterus, which is almost constant in spotted fever, is absent in typhus.

Defervescence of the fever in typhus takes place more quickly and is usually regarded as occurring by crisis.

Secondary infections and pneumonia are more common after typhus.

In recent years the bacterium-like bodies in lice, first described by Ricketts and Hegler and von Prowazek, and named *Rickettsia prowazekii* by da Rocha-Lima, have received much attention, and much support as the causative agent of typhus fever by da Rocha-Lima, Sergeant, Foley and Vialatte, Proeschler, Toepfer and Schuessler, Toepfer, Otto and Dietrich and others.

However, a large number of micro-organisms have been described as the causative agent of typhus. M. Rabinowitsch, in 1913, cultivated a minute "cocco-bacillus," which is now regarded by some as identical with rickettsia. Nicolle, Blanc

and Conseil found cocco-bacilli in 5 per cent. of lice collected from districts where there was no typhus.

Brumpt found rickettsia bodies in a large percentage of lice from healthy persons, and proved that these lice were not capable of transmitting typhus fever by allowing fifty of them to feed upon himself on two or three occasions. Other workers have found rickettsia in non-infective lice, and recently Arkwright, Bacot and Duncan have described rickettsia in lice fed upon trench fever patients.

The ætiological significance of rickettsia bodies in lice and in the blood of typhus patients is not yet proved, and as described by Ricketts, von Prowazek and da Rocha-Lima, they have a significant resemblance to the parasite of Rocky Mountain spotted fever. The recent findings of lesions of the endothelium in the blood-vessels of the skin by Fraenkel, Aschoff, Poindecker, Bauer, von Chiari and Jaffe in man, and by Neill in guinea-pigs, makes it seem probable that the pathology of typhus is very similar to that of Rocky Mountain spotted fever, and therefore that the ætiological relationship of rickettsia, at least as observed in the blood of patients, deserves serious consideration. The demonstration of the organism in the vascular lesions of typhus would do much to settle the question.

Rocky Mountain Spotted Fever and Tsutsugamushi Disease, or Japanese Flood or River Fever.—The similarity between these two diseases has long excited attention. Ashburn and Craig in 1908 published a comparative study, with the conclusion that they were not identical, though presenting many points of resemblance. The resemblances, as well as the differences between the two, are made accessible for a more complete comparison by the recent paper of Kitashima and Miyajima. Tsutsugamushi disease clinically presents a very strong resemblance to Rocky Mountain spotted fever. It is transmitted by the bite of the larva of an acarinen, commonly called the "akamushi mite," about whose scientific name there has been considerable discussion. The acarinen in question has been considered to be a trombidium, and was named *Trombidium akamushi* by Brumpt. The life-cycle has recently been studied by Miyajima and Okumura, who point out differences between the akamushi mite and trombidium, and its similarity to another genus—*Leptus*. They accordingly propose the name, *Leptus akamushi*.

The virus of tsutsugamushi disease, according to Kitashima and Miyajima, like that of spotted fever, is not filterable, and is extremely susceptible to chemical and physical agents.

Tsutsugamushi disease, like Rocky Mountain spotted fever, is limited to certain districts infected with its intermediate host, *Leptus akamushi* (*Trombidium akamushi*), namely, the provinces of Akita and Niigata in Japan. A similar disease in Java is transmitted by the larval stage of a mite whose habitat is in districts flooded at certain seasons of the year.

The mortality, like that of spotted fever, varies

in different districts, but unlike the latter, it varies from season to season in the same districts, and ranges from 14 to 55 per cent. As in the case of spotted fever, it is less fatal in the young. The majority of fatal cases die within twenty days; in Kitashima's and Miyajima's series of 300 out of 368 fatal cases, 94 died within ten days. The incidence is naturally highest among those exposed to the bites of the mite, and hence in land labourers.

The incubation period is seven to ten days, but may be as long as twelve to fourteen days. The prodromal symptoms and onset are similar to those of Rocky Mountain spotted fever. The fever reaches a maximum in three to four days, 40° to 41° C., and is of the continuous type and lasts one to three weeks, falling by lysis. The rash appears on the fifth to ninth day and does not become hæmorrhagic as in the case of spotted fever; it usually disappears within a week. The pulse remains slow as compared with Rocky Mountain spotted fever, 90 to 100, and is full and strong, varying in proportion to the fever.

In favourable cases recovery is complete by the fourth to fifth week. Two symptoms occur in Tsutsugamushi disease which are absent in Rocky Mountain spotted fever, a general painful swelling of the peripheral lymph nodes and necrosis of the skin at the site of the mite bite.

Nothing distinctive in the pathological anatomy has been described. The spleen becomes enlarged. The white blood count is at first below normal and later above normal for a short period.

Monkeys and guinea-pigs are susceptible to experimental inoculation; the latter, however, do not give a characteristic reaction as does the monkey. The field mouse, *Microtus montebelli*, is also susceptible, and is believed to be the important natural mammalian host of the virus.

The analogies between Rocky Mountain spotted fever and Tsutsugamushi disease are many. The chief differences, besides that of locality and nature of the intermediate host, are in the milder character of the rash, lymph node enlargement, and necrosis of the site of the mite bite in the latter.

A summary of the data upon which the conclusion has been reached that the micro-organism described is the causative agent of Rocky Mountain spotted fever includes the following facts:—

(1) The constant occurrence of a micro-organism of distinctive size and morphology in the lesions characteristic of the disease in man, monkey, rabbit and guinea-pig.

(2) The constant presence of an identical micro-organism exhibiting undoubted evidences of developmental phases in ticks of proved infectivity, and the absence of similar forms in proved non-infective ticks.

(3) The ability to recognize this specific micro-organism in the tissues and eggs of infective ticks in the presence of bacteria occasionally present in abundance in ticks of the species concerned.

The failure to cultivate this parasite is balanced by the proof furnished of its multiplication in and inseparability from infective ticks, and its absence

in non-infective ticks. The bacilli seen by Ricketts in large numbers in the tissues and eggs of non-infective as well as infective ticks are not to be confused with any phase of the spotted fever parasite. Ricketts did describe one form of this parasite which he found in blood films, namely, the lanceolate form.

The reasons for concluding that the parasite of Rocky Mountain spotted fever is not a bacterium, in the ordinary sense of the term are:—

(1) Its morphological sequence in infected nymphs, and the presence of only one morphological type in the blood of mammals.

(2) Its staining reactions and its appearance under dark field illumination.

(3) Its extreme susceptibility to physical and chemical agents.

(4) Its specificity for the peripheral blood-vessels, with the production of an identical type of lesion and disease course in all susceptible mammals.

Bacteria which are the causes of epidemics often show a striking specificity for certain tissues, for example, the meningococcus in epidemic cerebrospinal fever, the pneumococcus in pneumonia, and the typhoid bacillus in typhoid fever. In each of these diseases a preliminary invasion of the blood stream has been proved, yet the bacteria thrive best and produce their deleterious effects in certain tissues only. These bacteria, while pathogenic for animals, do not reproduce the diseases as they occur in man. Meningitis, it is true, can be produced by direct inoculation into the meninges of meningococcus cultures, or of numerous other pathogenic bacteria, while it is impossible to reproduce lobar pneumonia and typhoid fever in animals by any means. The viruses of rabies, poliomyelitis and vaccinia, on the other hand, if introduced into susceptible animals, do reproduce the diseases which they cause in man.

Classification with the protozoa also presents difficulties, chief of which is the lack of definite morphological proof, a difficulty largely dependent upon the minute size of the parasite. Protozoa are for the most part highly specialized in their host requirements, particularly those protozoa which are intracellular. The hæmoflagellates exhibit greatest versatility in this respect, but not comparable with that of the spotted fever parasite, with its wide range of mammalian hosts.

Three definite morphological types of the spotted fever parasite can be recognized: (1) An extracellular bacillus-like form without chromatoid granules, relatively large and only present in ticks during the initial multiplication of the parasites; (2) a relatively small rod-shaped form with chromatoid granules, probably the same form seen within nuclei in sections of ticks, and rarely in smooth muscle cells in the blood-vessels of mammals; and (3) a relatively large lanceolate paired form present in ticks and in the blood and lesions in mammals. This lanceolate form is characterized by its "chromatoid" staining reaction, and according to

the evidence at hand, is the form in which the virus is passed between the tick and mammalian hosts. The other two forms described are multiplicative stages, and can only be demonstrated occasionally and with difficulty in mammalian hosts.

The name *Dermacentrozensus rickettsi* is proposed for this parasite.

Current Literature.

INDIAN MEDICAL GAZETTE.

Vol. LVI, No. 2, February, 1921.

The Effect of the Control and Rationing of Rice on Beriberi (A. J. McClosky, M.D.).—Since the control and rationing of rice in 1920 the percentage of cases of beriberi has considerably decreased, owing to the fact that since the control more Rangoon rice has been eaten and less Siam rice, the latter being more potent in its beriberi producing powers than the other. Through the rationing of rice, more sweet potatoes and wheat-flour has been eaten, and this has helped to prevent the occurrence of beriberi.

The Use of Clamps in restraining Hæmorrhage during the Operation for Elephantiasis of the Scrotum (J. W. Porter, Major, D.S.O.).—An intravenous injection of 0.9 neosalvarsan is given four days before the operation which results in softening of the scrotum and disappearance of the corrugations. The scrotal tissues are reduced by massage and elevation, and steps are taken to cleanse the parts by hot water and soap. Three pairs of clamps are then used. A small incision is made in front near the root of the penis, and the unsheathed blade of one clamp is inserted and pushed on towards the perineum in the line of junction of the healthy and unhealthy portions of the scrotum. The blades are then firmly closed, the outer sheathed blade resting on the surface of the skin. A similar proceeding is effected on the other side. The skin incisions are rapidly and boldly made as far as the points of these clamps. After this, another clamp, both of whose blades are sheathed, is applied across the perineum by holding the scrotum forwards, and the mass is cut away. In this practically no blood is lost.

Some Observations on the Infant Mortality in Khulna District (Sarasi Lal Sarkar).—The fact that the infant mortality in the Khulna district is so high is thought by the author to be due to the scarcity of milk. This is due to the way in which the natives look after their cattle during the rainy season. The majority of the cows die through neglect, as they are left on land which is scarcely above the water level, and they stand knee-deep in water and mud all through the season, and feed on tall grass and plants growing on moist land. The question of cattle fodder has now been taken

up by the Agriculture Department with a view to finding out its bearing on the question of infant mortality.

Suggestion to Increase the Utility of the Medical College Journals (Capt. P. S. Gupte, I.M.S.).—The author suggests that medical college journals should contain concise and carefully written extracts of the leading articles in medical journals, thus saving great loss of time, and, in many cases, loss of interesting matter which would otherwise probably be left unread.

Preliminary Notes on the Use of Tincture Iodine intravenously (S. R. Bhattacharjee).—The author treated eighteen different cases, viz., three of mauling by leopards, one of cellulitis, ten of syphilis, and four of malaria with tincture of iodine given intravenously, the results of all being rapid as well as successful. Iodine was found to be successful where soamin, quinine and cinchonidine had failed.

Notes on a Recent Outbreak of Influenza (Major H. R. Dutton, I.M.S.).—During an outbreak of influenza in the Central Jail, Bhagalpur, the author noted the following facts:—

(1) The first cases were all mild, severe chest cases not developing until eight days after the disease first appeared in the jail.

(2) The apparent great value of curative vaccine injections in small, but gradually increasing doses.

(3) The great value of prophylactic inoculation, no case having occurred after the second dose had been given and only one after the first dose, in spite of there being about 150 men over 50 years old in the jail at the time.

(4) The only two deaths that occurred were uninoculated debilitated old men whose health was bad on admission to the jail, and who had very severe lobar pneumonia, which may or may not have been actually part of the disease, but an additional complication.

(5) The sodium bicarbonate and cinnamon mixture, combined with open-air treatment, provided a rapid cure for the ordinary uncomplicated cases.

Notes on a Case of Venereal Papilloma (A. Visuvalingam, I.M.S.).—A Malay patient was admitted to hospital at Kuala Kangsar Hospital in 1919. On admission he complained of a "fleshy" growth on his penis and "sores" about the groins of three years' duration. The growth is said to have started from a sore he contracted after an impure coitus three years before. This was followed by "buboes" in the groins, which have since developed into serpiginous ulcers.

On examination, the patient was found to have a papilloma of typical cauliflower appearance arising from the tip of the glans penis on all sides of the external meatus, and ulceration of the groins and scrotum. The parts were cleaned and the growth excised. The patient was placed on anti-lynetic treatment and responded well, leaving the hospital three months after admission.

Original Communications.

THE KERATOSIS PILARIS OF JACKSON AND BROcq IN THE ANGLO-EGYPTIAN SUDAN.

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CONTENTS.—Introductory—Historical—Khartoum Cases—Pathological Histology—Ætiology—Classification—Diagnosis—Treatment—Summary—References—Illustrations.

Introductory.—The present note is the sixth (*vide* references) of its kind to be published in the JOURNAL OF TROPICAL MEDICINE AND HYGIENE dealing with the Hyperkeratoses as seen in the Sudan.

So far as we know, nothing has ever been written concerning this disease as seen in the tropics, while there is still much confusion in regard to its nomenclature and nature as seen in temperate climates. These two considerations, together with the fact that the disease is not uncommon in the Sudan, have tempted us to record our views thereon.

Historical.—Erasmus Wilson suggests that the disease was known to the ancients under the term *Xerasia capitis*, because this was described as a pityriasis, followed by the falling out of hairs.

Be this as it may, it is Bazin who, in the 'sixties of last century, first isolated the disease and gave it a special name, viz., *Lichen pilaris par hypertrophic*. The term lichen, however, is not suitable for the affection, and, therefore, this name, though used at times, has fallen into a synonym of the name used at the head of this note.

In 1862 Hardy is said to have used the term *Aene Cornée* of Bielt and Cazenave and also *Ichthyose eorné* for this affection, but we have been unable to refer to his writings, and the editions of Cazenave's works, which we possess, do not mention this disease.

In 1876 Erasmus Wilson first gave a clear account of the disorder, which he considered to be nearly allied to *Ichthyosis* and to run in families. He described it as a subacute inflammation of the hair follicles producing red punctate elevations at their apertures, thus causing a sensation of roughness when the hand is passed over the affected skin. The areas implicated in his cases were the eyebrows, the maxillary region, the back and upper arms. The elevations at the mouths of the follicles were noted to be caused by epithelial cells, and were followed by a dropping out of the hairs. He named the complaint "*Follicularis rubra*," but noted that the redness might be marked or might be almost absent.

In 1877 Tilbury Fox gave an illustration of *Lichen pilaris* in fig. 1 of Plate XI of his "Atlas of Skin Diseases," and says that the papules are formed by

the exudation of plastic matter into the follicular walls. The papules are formed at the mouths of the hair follicles, and are generally pressed by the hair shaft. In 1877 he showed a case at the British Medical Association which, according to MacLeod (to whose paper we are indebted for information), Hutchinson suggested to be an *Ichthyosis* of the hair follicles.

In 1878 he considered that he had found a condition resembling the above but differing therefrom by its greater severity, its deeper and more complete implication of the hair follicles, its more general distribution, and by its congenital origin. This new disease he named "*Cacatrophia folliculorum*," and noted that it occurred, principally, in strumous young women.

In 1879 Guibout described a disease under the name "*Acne cornée, sebacée*," which has been thought to be *Keratosis pilaris*, *Keratosis follicularis* variety *spinulosa* of Devergie and Unna, and Brooke's Contagious *Keratosis*. It probably is not *Keratosis pilaris*.

In 1882 Lemoine described the same complaint under the term "*Ichthyose ansérine des scrofuloux*," stating that it was rare and only occurred in the scrofulous.

In 1885 Lesser recorded a case of *Ichthyosis* limited to the hair follicles, which he says is quite rare, and has only been described in detail by Guibout. He considered Guibout's name to be improper, and because of its pathological similarity to *Ichthyosis* he calls the disease "*Ichthyosis follicularis*." He notes that it is distributed on the extensor surface of the extremities as well as on the scalp, face, nose, and auricular edges, in the form of thin compact scaly columns, whitish or greyish, projecting from a large number of follicles. He points out that the condition is analogous to *Lichen pilaris*, but he says that he believes that the scales of *Lichen pilaris* lack the cornification of those of *Ichthyosis*.

Also in 1885 Liveing recognized the same complaint and called it "*Follicular xerodermia*," while in the following year Hardy suggested that Guibout's "*Aene cornée*" should be restricted to *Lichen pilaris*, and recognized as a different disease from the condition described by Lesser, which he named "*Ichthyose cornée*."

In 1887 Jackson first described the condition as *Keratosis pilaris*, a name subsequently adopted in 1890 by Brocq. About this time Thibierge, writing on *Ichthyosis*, described a localized variety under the terms "*Xerodermie pilaire*" and "*Ichthyose ansérine*."

In 1889 Besnier brought forward the names *Xérodémie pilaire*, *Erythémateuse progressive*, *Ichthyose rouge*, *Ichthyose pilaire* and *Ansérine rouge* for the complaint, and in the same year Taenzer gave to advanced cases the name *Ulerythema superciliaire sue ophryogenes*. He distinguished between a milder and a more severe form of the complaint. He noted that it occurred in families. In his cases it began in the eyebrows,

but affected the face, arm and forearm in some cases.

In 1890 Brocq reviewed the antecedent work and adopted Jackson's name of *Keratose pilaire*. He defined the disorder as acuminate or rounded follicular papules situate on a more or less red inflammatory skin, surrounded by dry skin and associated with atrophy of the hairs. The distribution was the face, trunk and limbs on which they appeared as circumpilar elevations, rounded or acuminate about the size of a pin's head, and surmounted by a dry scale or spine 0.5 to 1 mm. in length. He distinguished two varieties, *Keratose pilaire blanche*, non-inflammatory, and *Keratose pilaire rouge*, inflammatory and often acneiform. As a rule there were no subjective symptoms, but there might be itching. The most common situations were the extensor aspects of the arms and forearms, of the thigh and leg, and also on the buttocks. On the face it was found about the eyebrows, forehead and jaws. When involution took place small scars were formed, and the hairs dropped out. The disease was said to appear in infancy, but to increase up to puberty, then to remain stationary during adult life, and to disappear in old age.

In 1889 Taenzer in Unna's clinic described a persistent erythema with elevation of small horny masses at the mouths of the hair follicles of the eyebrows, forehead, cheeks, neck and upper arms. The affected hairs were broken off short, and after persisting for years were followed by follicular and interfollicular atrophy and the formation of small scar-like depressions. He named it *Ulerythema ophryogenes*. Unna says that, except for the scar formation, it resembles his *Keratosis suprafollicularis*.

In 1894 Unna gave it the name *Keratosis suprafollicularis* (alba et rubra), and described the pathological anatomy of eight cases.

In 1903 Giovanni studied the histology in twenty-five cases, in some of which he could not find inflammatory changes, while in others these were a marked feature. He noted atrophic changes in the sebaceous glands, arrectores, and in the hair.

In 1904 Chalmers Watson gave an account of the disease under the name *Keratosis pilaris* associated with a histological study, by which he came to the conclusion that the changes in the cutis vera were the primary changes, while those in the epidermis were secondary. Further, he believed that the cause was a chemical irritant coming from the alimentary canal. His treatment, which was most successful, was to give castor oil four times in ten days, and then every day to give a dose of sulphate of magnesium and sometimes an enema of plain water. Locally he applied hot water to the part and rubbed in myelocene. In this case the buttocks showed the typical eruption, while the head showed alopecia. He studied skin from the buttocks histologically, and found that there was a sclerosis of the corium with cellular infiltration in the papillary layer and around the blood-vessels, which were thickened, while the sebaceous glands were altered, and to a

lesser extent the sweat glands and the hairs imperfectly developed.

In 1905 Crocker described the disease under the name *Keratosis pilaris*.

In 1909 MacLeod wrote an exceedingly able paper on "*Ichthyosis follicularis*," which, as already stated above, has been of the greatest service to us in assisting us in tracing out the history of the complaint. He pointed out that his cases corresponded in almost every detail with those of Brocq.

He also studied the histopathology of the lesions, noting that the mouths of the pilo-sebaceous follicles were filled with horny plugs and dilated so as to form acuminate papules, while the lower two-thirds were atrophied. The sebaceous glands were noted to be absent, while the presence of a slight general hyperkeratosis (but no parakeratosis, though the rete was defective between the follicles) was recorded, as was a dilatation of the vessels of the corium in the neighbourhood of the follicles. This dilatation was associated with an infiltration of small, round, oval, or spindle-shaped connective tissue cells about the capillaries and follicles. Plasma and giant cells were absent, and the rest of the corium was normal. Sweat glands were present. He concluded that the primary seat of the disease was in the epidermis and that the hyperkeratosis was a marked feature, not only affecting the follicles, but also the intervening skin, while the thinning of the rete suggested a mild ichthyosic process.

Clinically the disease showed pinhead-sized follicular papules of the colour of the skin and without inflammatory halo, and generally surmounted by conical horny plugs, which, when picked out, left a small depression. The lesions were roughly symmetrical on the extensor aspects of the upper limbs, back and sides of neck, upper lip, ciliary and superciliary regions and buttocks. The scalp was bald and the eyebrows and eyelashes were absent. There was also trachoma and conjunctivitis.

In 1911 MacLeod gave another excellent account of the diseases on pages 724-728 of Allbutt and Rolleston's "System."

In 1916 Stelwagon gave a good history of the complaint which is known to occur in America.

Gougerot in 1917 wrote an excellent condensed description of the disease.

This history makes it sufficiently clear that various authors observing different stages of one and the same disease have labelled these stages by different names, and have considered them to represent different diseases.

We will now turn to our Khartoum cases.

Khartoum Cases.—As examples of the disease in the Sudan, we select two cases: one in a man and another in a girl. In the man, the case is more advanced and severe; in the girl, it is in an early stage and mild in type.

Case I.—The patient is a Sudanese soldier, aged some 22 years, and belonging to the Matisi tribe of Khogelab, near Khartoum.

He believes that his mother and two of his sisters

are affected by the complaint, but too much reliance must not be placed upon this statement, for, though the patient is intelligent and answers questions readily and clearly, he may be mistaken.

He thinks that he has had the disease a very long time, but cannot say whether it was present when he was a small child.

The eruption, with which we are concerned, is depicted in Plate I, figs. 1 and 2 of which, if examined, show a number of small pinhead-sized papules.

Fig. 1 shows the extensor aspect of the left leg, which is affected by a large, more or less continuous, patch of papules extending from about 3 in. to 4 in. below the knee to some 6 in. above the ankle.

The papules (figs. 1-3) are seen to be follicular and in places discrete, pin's head in size, elevated, hard and dry. The centre, which is whitish (fig. 3), is situate on a glazed, shining, dark-coloured, smooth plateau, around which lies a circular striated area.

If this whitish centre is picked out, it is seen to be composed of white scales and to leave behind it a depression in the skin in which, sometimes, a hair may be seen. At other times the whitish centre is pierced by a hair or shows a black dot, which indicates the shaft of a hair broken off short.

The papules (figs. 1, 2 and 3) may remain discrete or may congregate together so as to form large areas, and when this happens, the skin, intervening between individual papules, is distinctly hyperkeratotic (fig. 3). In other places, however, the intervening skin is normal.

When the hand is passed over one of these patches, a sensation is experienced analogous to that produced when a nutmeg grater is similarly examined.

The right leg (fig. 2) is affected in much the same manner as the left, but the papules are less congregated together and more discrete.

The patient appeared to be in excellent health, and no history of tuberculosis or syphilis could be obtained, while yaws is unknown in the district from which he comes.

In regard to the rest of the skin there were no other patches of *Keratosis pilaris*, but he suffered from seborrhœa of the nose, chest, back and arms, and in the flexures of the fingers and palms of the hands there were a few white scales, while he sweats profusely from the face and palms of the hands.

He did not improve under our treatment, and at the present time, some two years after his first examination, he is in much the same condition.

Case II.—This case occurred in a young native girl in the practice of Dr. Malouf of Khartoum.

The disease, which is shown in figs. 4 and 9, was recognized in its earliest stages and while still mild in character.

It will be observed to consist of discrete pinhead-shaped follicular papules separated by normal skin (fig. 9), but otherwise resembling those occurring in Case I.

This case was rapidly cured under tonic treatment, as will be detailed below.

Pathological Histology.—The First Case.—If one of the papules shown in fig. 1 is excised with a little of the surrounding skin, and after fixation in picric acid is hardened in alcohol and cut into serial sections, it will be seen that the hair follicles are mainly implicated.

If fig. 5 is examined, it will be noted that the outer third of the follicle is dilated and filled with epidermal scales, while the follicle below is atrophied, as is the sebaceous gland.

Around the follicle, but particularly near the mouth, is an increase of the connective tissue cells shown more highly magnified in fig. 7. Near an affected follicle the vessels of the papillæ are dilated and surrounded by an increased number of connective tissue cells, but the further one gets from this follicle the less are the changes to be seen, and soon a normal condition is reached.

If the epithelium on the left of fig. 5 is examined, it will be seen that the cells of the rete are very vacuolated, while the horny layer is increased in thickness. This condition of the epidermis is more clearly evident in fig. 6.

Fig. 8 shows a piece of skin between two adjacent hair follicles. The thickened horny layer and the cellular increase in the subpapillary layer is marked. This cellular increase is similar to that depicted in fig. 7, which is composed of young connective tissue cells.

Between two adjacent hair follicles the stratum corneum (fig. 11) shows a certain amount of parakeratosis and thickening, while there is the usual papillary and subpapillary increase of cells and apparently a slight amount of acanthosis.

The subpapillary accumulation of cells was especially marked in one very limited area near the follicle, and there the cells of the stratum germinativum and those of the rete were much disorganized. In this region the stratum granulosum was absent (left of fig. 8), and the stratum corneum showed definite parakeratosis.

This highly affected area was, however, very limited in size, and at a little distance on each side thereof the stratum germinativum was normal, the rete cells were only vacuolated, and further away became normal, while the stratum granulosum was again visible.

As the very affected region is approached from healthy tissue the stratum granulosum disappears, as does the stratum lucidum, while the horny cells become nucleated and small vacuoles appear in those of the rete. A little nearer the rete cells show degeneration, and their contents become homogeneous. This area is followed by that of greatest disturbance just described above.

The cellular exudate (fig. 7), so often referred to, is composed of connective tissue corpuscles mostly in relation to capillary or other vessels. No plasma or giant cells are to be seen and no polymorphonuclear leucocytes.

The arrectores pilorum (fig. 12) belonging to the affected follicles are distinctly larger than normal, but no abnormal changes were noted in the sweat apparatus.

The Second Case.—The second case is much earlier and milder, and fig. 10 shows the essential histological features. The hair is caught in the hyperkeratosis of the mouth of the follicle. The epithelial changes are slight, but the vessels of the corium are surrounded by cellular infiltration.

The essential features of the pathological histology appear to be:—

(1) Mild reaction on the part of the cells of the corium against some irritant coming by the blood-vessels.

(2) Secondary changes in the hair follicles

(3) Tertiary changes in the epidermis.

(4) The production of the characteristic features of the eruption by the changes in the hair follicles, and to a less extent by those in the surrounding epidermis.

Ætiology.—It seems from a study of *Keratosis pilaris*, as found in the Sudan and as set forth in literature, that there are two distinct conditions confused under this term, viz.:—

(A) The mechanical blocking of the hair follicles with dirt leading to a mild irritation of the follicular epidermis and a horny plug. It is conceivable that left to itself this will mechanically lead to changes in the lower part of the hair follicle and in the sebaceous gland. This represents Neumann's "Scarcely a Disease."

(B) The circulation of some chemical substance in the blood-stream which, on arrival in the capillaries of the superficial part of the skin, causes dilatation and a proliferation of the surrounding connective tissue cells.

In its mildest form this chemical substance appears to pass off *via* the sebaceous glands and the neck of the hair follicle causing the changes therein which have been described above.

In the more severe forms this poison passes away by the hair follicles and the skin, and leads to keratosis between the hair follicles.

After the acute stage the condition may become chronic, and it would appear as though this was the phase which has mostly been studied in Europe under the names *Keratosis suprafollicularis* for the mild cases, and *Ichthyosis follicularis* for the more severe, while *Ulcerythema ophryogenes* represents a more advanced severe type.

As to the nature of the chemical substance this is unknown, but as it runs in families, and as so many of these hyperkeratoses are known to be associated in some way with yaws, syphilis or tuberculosis, and as some history of what used to be called the "*Strumous Diathesis*" is often found in the family, and, further, as yaws and syphilis can generally be excluded, the suggestion remains that, in some way, this chemical substance is related to tuberculosis, which acts by sensitizing the cells, but requires a second chemical stimulant to produce the disease.

As to the origin of this second chemical substance, the success of Chalmers Watson's treat-

ment of his case points to the possibility of its origin being from the alimentary canal.

Further, the ease with which some mild cases are cured by ordinary tonic treatment indicates that the general raising of the resistance of the body points to some mild toxic process.

It may be that A and B are closely related, and that the mechanical factor is capable of acting only on cells which have already been sensitized and are, therefore, ready for stimulation.

Classification.—It is obvious that *Keratosis pilaris* comes under the heading of *The Hyperkeratoses*, and utilizing the classification adopted by Castellani and Chalmers on p. 2256 of the "Manual of Tropical Medicine," it will be placed in their Division B, i.e., "Hyperkeratoses of Unknown Origin." These are believed to be remotely associated with syphilis, yaws, tuberculosis, &c.

As *Keratosis pilaris* develops in post-uterine life and is a localized affection attacking principally the hair follicles, it is classified as a *Kerätosis*. We will now consider the *Keratoses*.

The Keratoses.—A *Keratosis* may be defined as:—

"A Hyperkeratosis of unknown origin, but possibly remotely (chemically) associated with some infection, such as tuberculosis, and with lesions mainly, but not exclusively, follicular in origin."

The various diseases, known to us, which may be classified as *Keratoses* are:—

(1) *Keratosis follicularis* variety *spinulosa* of Devergie and Unna.

(2) *Keratosis follicularis* variety *contagiosa* of Brooke.

(3) *Keratosis follicularis* variety *vegetans* of Darier.

(4) *Keratosis striata et follicularis* of Hebra.

(5) *Keratosis pilaris* of Jackson and Brocq.

These five *Keratoses* may be distinguished, clinically, as follows:—

A. With horny projections as a marked feature as they are in the form of spines:—

(i.) The horny projections are filiform spines.

a. Spiny lesions the sole eruption ... *Keratosis follicularis*, variety *spinulosa*.

b. Spiny lesions associated with large fleshy papules ... *Keratosis follicularis*, variety *contagiosa*.

(ii.) The horny projections are wart-like elevations, or coarse spines some of which are almost like minute horns.

These projections are situate on papules or nodules which may in places run together to form tumours. ... *Keratosis follicularis* variety *vegetans*.

B. With horny projections not a marked feature as they are in the form of plugs and not definite spines:—

(i.) Papules and Striæ present ... *Keratosis striata et follicularis*.

(ii.) Papules with or without scars present ... *Keratosis pilaris*.

With regard to group A, there is a growing impression that they represent mild, severe, and very severe forms of one and the same pathological process.

Hebra's variety probably belongs to Keratosis pilaris, but this cannot be definitely asserted at present.

In regard to Keratosis pilaris, it also embraces a number of conditions which probably merely exhibit mild, severe and very severe forms of one and the same pathological process. These may range from the condition described above in the small girl through the *Keratosis suprafollicularis* of Unna to the *Ulerythema ophryogenes* of Taenzer and the *Ichthyosis follicularis* of Lesser.

The synonyms of Keratosis pilaris, which have been carefully investigated by MacLeod, are as follows:—

1. *Xerasia capitis* Ancient Writers.
2. *Lichen pilaris par hypertrophie* ... Bazin, 1862.
3. *Follicularis rubra* Erasmus Wilson, 1876.
4. *Cacatrophia folliculorum* Tilbury Fox, 1878.
5. *Ichthyosis anserine des scrofuloux* ... Lemoine, 1882.
6. *Ichthyosis follicularis* Lesser, 1885.
7. *Follicular Xerodermia* Liveing, 1885.
8. *Xerodermie pileaire* Thibierge, 1887.
9. *Xerodermie pileaire erythémateuse* ... Besnier, 1889.
10. *Keratose rouge* Besnier, 1889.
11. *Keratosis suprafollicularis* Unna, 1894.
12. *Ulerythema ophryogenes* Taenzer, 1889.

MacLeod also gives *Ichthyosis cornea* of Hardy, *Keratosis follicularis* of Kaposi, *Pityriasis pilaris* of Hardy, while the facial variety is termed *Keratose pileaire faciale* by Gougerot.

Diagnosis.—The essential features of Keratosis pilaris are:—

(1) Follicular conical papules occurring on any part of the body.

(2) Surrounding skin may or may not be hyperkeratotic.

(3) In the black skin the papules themselves are dark in colour, and if erythema is present it can only be judged very vaguely if there is marked surrounding hyperkeratosis.

(4) The hairs of the affected follicles break off and subsequently the follicles atrophy.

(5) In certain cases depressed scars are to be found at the site of the eruption.

Under the heading of classification a certain amount of differential diagnosis has been given, but two conditions require further consideration, viz., *Lichen scrofulosorum* and *Pityriasis rubra pilaris*, and to these may be added *Lichen planus*, *Seborrhæa spinulosa*, and the *Miliary follicular syphilide*.

From *Lichen scrofulosorum* it may be differentiated by the distribution being on the head, face, or extremities and by the papules not being in rings, or segments of rings, while a tubercular history is not, as a rule, evident.

From *Pityriasis rubra pilaris* it may be diagnosed by the absence of the scaliness on the head and the papules on the first phalanges of the fingers.

From *Lichen planus* it may be recognized

by the absence of the bluish-black angular papules often with a central depression and by the absence of marked pruritus.

From *Seborrhæa spinulosa* it may be separated by the absence of the yellow plugs or spines, and also of the oily skin.

From the *Miliary follicular syphilide* it may be divided by the absence of all signs of syphilis, by the absence of grouping which, in the case of the syphilide, resembles that of *Lichen scrofulosorum*. This grouping may, however, be absent and the distribution may be general, in which case, especially if the eruption has been persistent, the two conditions may somewhat resemble one another, and may require care in differentiation.

Prognosis.—In early and slight cases this is good, but in advanced cases with ichthyosis no improvement occurs.

Treatment.—In order to be successful the treatment must, we believe, be based upon the idea that the disease is due to a mild form of toxin reaching the skin.

If this is coming from the alimentary canal, as was evidenced in Chalmers Watson's case by the constipation, fætid stools and abnormally slow pulse, then intestinal disinfection is indicated, and will probably do good as in that case.

If it is not obvious whence the mild poison is coming, the best plan is to raise the resistance of the patient by tonics, and this was successful in the case of Dr. Malouf's little patient (Case II), in whom the eruption disappeared quickly after a month's treatment with syrup of the phosphate of iron.

In long-standing cases nothing can be done. We tried light therapy with our first case as well as emollient ointments, but without success. Probably the most useful of these external remedies for cases with a certain amount of ichthyosis is the "Mollin's Inunction," recommended by Brooke, which is composed of lard saponified with caustic potash, to which is added some fresh lard and a little glycerine. It is said to contain some free caustic potash, which probably loosens the scales.

Summary.—We have invited attention to the presence of *Keratosis pilaris* in the tropics, and we believe its causation, even in the mildest cases, to be due to some mild form of toxin which only produces results when acting upon cells sensitized by some remote infection. In some cases it appears possible that this remote infection may be tubercular in nature, but possibly this will not explain all cases.

The action appears to fall *ab initio* on the vessels near the hair follicles, but later to affect the skin between them.

The disease is easy to cure in the early stages of its mildest forms, but incurable in late stages of more severe types.

Khartoum,

December 8, 1919.

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ILLUSTRATIONS.

PLATE I.

FIG. 1.—Left leg of a Sudanese man, showing Lichen pilaris. Photograph. Reduced.

FIG. 2.—Right leg of a Sudanese man showing Lichen pilaris. Photograph. Reduced.

FIG. 3.—Enlargement of a portion of fig. 1 to show Ichthyosis condition of the interfollicular skin. Photograph. Reduced.

FIG. 4.—Arm of a Sudanese girl to show slightly developed and recent eruption. Photograph. Reduced.

PLATE II.

FIG. 5.—Hair follicle showing a papule from fig. 1. Photomicrograph $\times 50$ diameters.

FIG. 6.—Mouth of the hair follicle and adjoining epidermis to show cellular degeneration in the rete. Photomicrograph. $\times 200$ diameters.

FIG. 7.—Cellular infiltration about a hair follicle. Photomicrograph. $\times 600$ diameters.

FIG. 8.—An area with hyperkeratosis, no acanthosis, but with disturbance of the deeper parts of the rete, and marked cellular infiltration into the subpapillary Corium. Photomicrograph. $\times 140$ diameters.

PLATE III.

FIG. 9.—Enlargement of a piece of fig. 4. Photograph. Enlarged.

FIG. 10.—Papule from fig. 4 showing the hyperkeratosis in the mouth of the hair follicle. Photomicrograph. $\times 140$ diameters.

FIG. 11.—General view of the cellular infiltration in the subpapillary layer from the case depicted in fig. 1. Note also the hyperkeratosis, parakeratosis, and the acanthosis. Photomicrograph. $\times 75$ diameters.

FIG. 12.—Strongly developed Arrector Pili muscle from the case depicted in fig. 1. Photomicrograph. $\times 140$ diameters.

NOTES ON *MONILIA METALONDINENSIS* (CASTELLANI, 1916) AND *EPIDERMOPHYTON RUBRUM* (CASTELLANI, 1909).

By ERIC C. SPAAR, M.D., M.R.C.P.

Pathologist, General Hospital, Colombo, Ceylon.

MONILIA METALONDINENSIS (CAST.).

MARTINA, a Singhalese girl, aged 15, was admitted to the General Hospital under my care with an extensive milky growth on her hard palate, which it almost entirely covered. At the edges the appearance was of a pinkish colour, slightly raised. On scraping, a rather raw, pinkish surface was found underneath, but there was no bleeding, the symptoms disappearing after using regularly a potassium chlorate mouth-wash.

Several tubes of glucose-agar cultures were inoculated from the lesions, and a fungus was isolated with all the botanical characters of a monilia. The principal cultural and biochemical features of the species I have grown are the following:—

Agar and Glucose-agar.—Abundant growth of a creamy-white colour.

Gelatin.—Fairly abundant growth, the medium not liquefied.

Serum.—Growth rather scanty, medium not liquefied.

Litmus Milk.—No change, or only slight acidity. Complete absence of gas.

Sugars and other Carbohydrates.—The fungus ferments, with production of acid and gas, glucose, levulose, maltose, galactose. It does not ferment lactose, saccharose, raffinose, inulin, dextrin, nor any other carbohydrate I have experimented with.

Biochemical characters of *Monilia* isolated.

Monilia	Glucose	Levulose	Maltose	Galactose	Saccharose	Inulin	Dextrin	Lactose	Lit. milk	Gelatine	Serum
5th day	AG	AG	AG	AG	O	O	O	O	O	O	O

AG = acid and gas.; O = negative, viz., absence of gas, of liquefaction, of coagulation.

PLATE I.



Fig. 1.



Fig. 2.

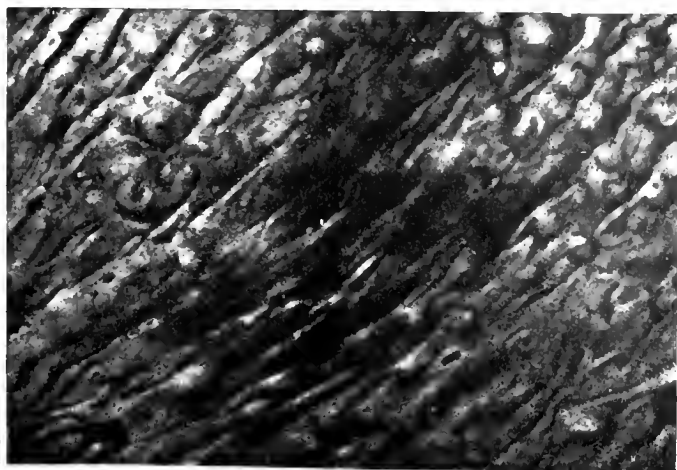


Fig. 3.



Fig. 4.

PLATE II.



Fig. 5.

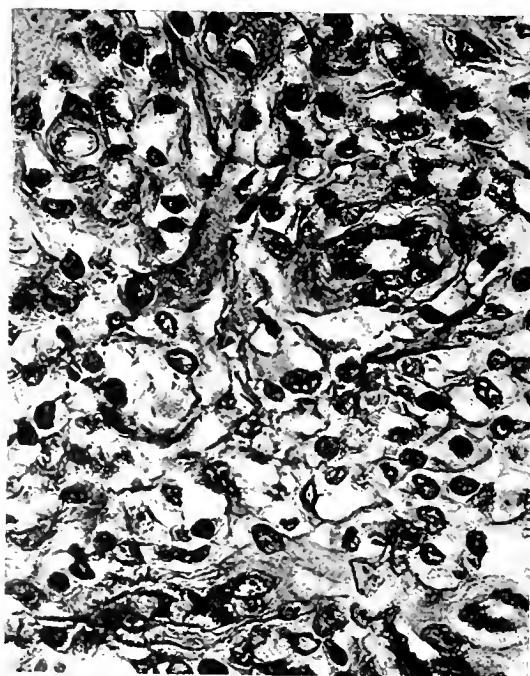


Fig. 7.



Fig. 6.



Fig. 8.

PLATE III.



Fig. 9.

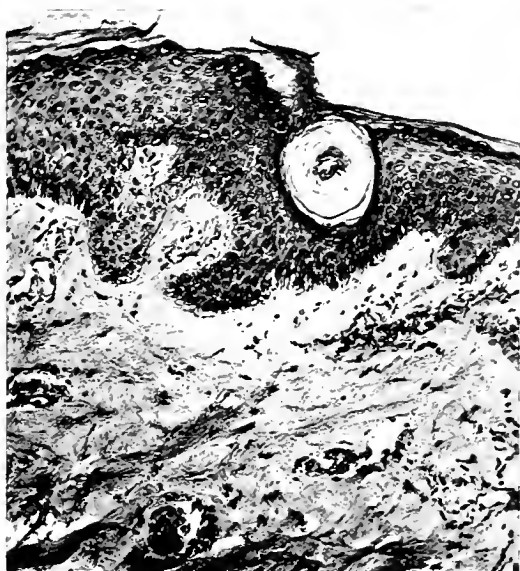


Fig. 10.



Fig. 11.



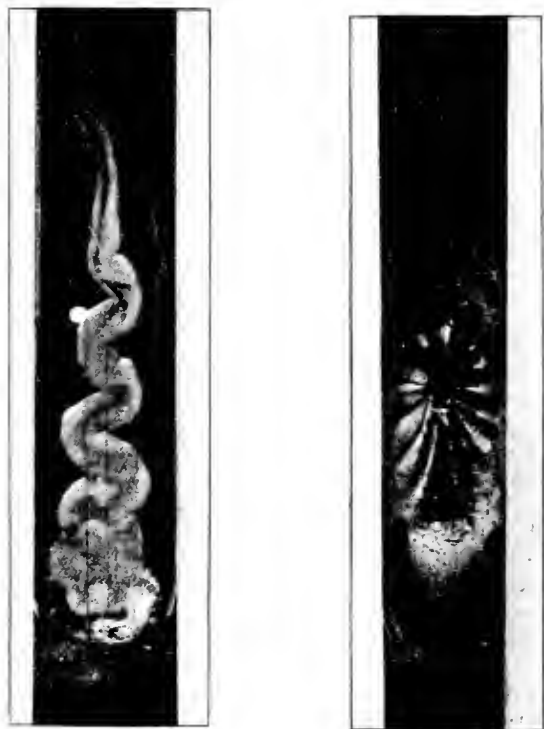
Fig. 12.

Classification of the Fungus.—Fungi of the genus *Monilia* have been separated by Castellani into several groups, according to their fermentative properties, but unfortunately many monilias soon lose some of their original fermentation characteristics, and therefore only very recently isolated strains can be classified. The groups recognized by Castellani and Chalmers are the following:—

(1) *Monilia balcanica* Cast. type.—Gas produced in glucose only.

(2) *Monilia krusei* Cast. type.—Gas produced in glucose and levulose only.

(3) *Monilia pinoyi* Cast. type.—Gas produced in glucose, levulose and maltose.



Monilia metalondinensis Cast. *Epidermophyton rubrum* Cast.

(4) *Monilia metalondinensis* Cast. type.—Gas produced in glucose, levulose, maltose and galactose.

(5) *Monilia tropicalis* Cast. type.—Gas produced in glucose, levulose, maltose, galactose and saccharose.

(6) *Monilia guillermondi* Cast. type.—Gas produced in glucose, levulose and saccharose.

(7) *Monilia macedoniensis* Cast. type.—Gas produced in glucose, levulose, galactose and saccharose.

(8) *Monilia pseudo-tropicalis* Cast. type.—Gas produced in lactose in addition to other carbohydrates.

(9) *Monilia pseudo-londinensis* Cast. type.—Gas produced in dextrin in addition to other carbohydrates.

(10) *Monilia zeylanica* Cast. type.—No gas produced in any sugar.

The monilia I have isolated ferments, with production of gas, glucose, levulose, galactose and maltose; it belongs therefore to the *metalondinensis* group. This group contains two species: *M. metalondinensis*, which does not clot milk, and *M. pseudo-metalondinensis*, which clots this medium; my strain does not clot milk, and therefore in all probability it is *M. metalondinensis* Cast.

EPIDERMOPHYTON RUBRUM (CAST.).

A planter came to consult me some months ago for a very itchy eruption on the buttocks. I made scrapings, and treating them with liq. potassæ, I noted the presence of some mycelial filaments. Several glucose-agar tubes were inoculated and a fungus isolated with the following cultural characters:—

On glucose-agar (4 per cent.), which seemed to be the best medium for this fungus, the growth was of a very deep red colour, and the red pigmentation spread to portions of the medium itself. In old cultures abundant duvet may be present, of a whitish colour, and this duvet may hide the red pigmentation to a great extent.

On Sabouraud's maltose-agar the fungus grows quite well, but perhaps less abundantly than on glucose agar. The growth begins to appear three to six days after inoculation in the shape of a reddish spot which gradually darkens. Later on the colonies, which are of a deep red colour, may become crateriform, or may present a central knob, and are generally covered by some delicate whitish duvet. When the cultures are very old, this white duvet becomes thicker and much more abundant, and the red pigmentation is almost completely hidden. The fungus can also be grown on ordinary agar, but on this medium, as a rule, no red pigmentation is noted.

From the characters I have described the fungus should be classified as *Epidermophyton rubrum* Castellani.

REFERENCES.

CASTELLANI. "Milroy Lectures on the Higher Fungi in relation to Human Pathology," *Lancet*, 1920.

CASTELLANI and CHALMERS. "Manual of Tropical Medicine," 3rd edition, p. 1079 and p. 1014.

Sleeping Sickness Diagnosis (A. Broden, *Annales de la Société Belge de Médecine Tropicale*, No. 1, November, 1920).—The author relies chiefly on puncture of the lymphatic glands, and reiterates the importance of considering anyone showing these glands enlarged in a region where sleeping sickness is endemic, as suspect. As a supplementary measure, the examination of the blood by centrifuging is recommended. Lumbar puncture is useful as showing the stage of the infection and indicating the treatment to be given.

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THE JOURNAL OF

Tropical Medicine and Hygiene

MAY 2, 1921.

COMMENTS ARISING FROM RECENT STATEMENTS IN THE PUBLIC PRESS UPON YELLOW FEVER, ITS CAUSES AND TREATMENT.

YET another anti has been declared to have been prepared, this time for yellow fever. It has got no further than the popular press by which marvellous

discoveries are as common as raindrops. Now it is the case of cancer, a cure for cancer by yet another herb in the form of a decoction, by the odour of a special variety of violets, the boiling of fir cones, or wrapping in goats' skins the afflicted soul.

This time it is an immunity to yellow fever that is brought about, and we are thankful that it should be so. We are not in a position to declare for or against this report; what we are disconcerted over is the fact that sufficient cases of yellow fever remain in the world requiring to be protected against or even to supply the material necessary to even experiment with, and from which to prepare the material for injection.

According at any rate to reports, yellow fever had been completely eliminated from the littoral of the Gulf of Mexico and other parts of the earth where the disease once held uncontrolled sway. The descent upon Cuba by Gorgas and his distinguished colleagues led to the extermination of yellow fever, and the example they set stimulated others to follow their methods, and in twelve months or so a great scourge had been swept from the earth. Whisperings of a disturbing kind have reached us from time to time that the disease was not yet extinct, and the most recent news is that it has been found necessary to supplement sanitary endeavour by a vaccine. Not that we doubt the success of the finding, but we confess to disappointment that it is found to be necessary. It shows that report was wrong; whilst we were congratulating ourselves that another scourge had been wiped off from the extensive category of disease, our hopes and beliefs have been shaken by the necessity for still further measures of prophylaxis. The destruction of the breeding places of yellow-fever-bearing mosquitoes was a measure believed to be as final in its results as the draining of the fen country in Britain purged this country of malaria for ever, and had become so rare that it was as difficult if not as impossible to find in Cuba, as malignant malaria in Britain. Given a recrudescence of yellow fever we welcome the new discovery and hail the discoverer as a benefactor.

The declaration, however, shows that yellow fever is still with us and that the total extermination is a mere popular legend. It reminds one of Lister's discoveries in Edinburgh fifty years ago. Pus had been abolished in surgery according to Edinburgh reports, and the pathologists in the University had to get pus from London to show their students, as none was to be had locally in the Scottish capital. Pus, however, still keeps a slithering hold on the confines of surgery and so, it would seem, does yellow fever. Whilst the health of the Panama Canal was supervised and closely guarded by Gorgas and his staff yellow fever and other mosquito-borne ailments were in abeyance, but when the guard is less keenly kept the enemy becomes more bold and ventures abroad. The method of prevention was shown to the natives of the Gulf of Mexico, but the continuance of the fight was

left to a public not in the front rank of civilization and products of a country where heat and moisture tend to laxity in sanitary matters. In every country it is the same tale: in a certain state of society hygienic and sanitary steps are anathema, and only by State legislation and enforced measures can the people be brought to a state of co-operation in public works. Discipline in such matters is difficult to maintain in the most advanced communities, and it becomes well-nigh impossible to preserve amongst primitive peoples. In spite of popular reports that yellow fever is extruded from its home, we are brought face to face with the fact that such is only a pious hope. The writer lately was congratulating a doctor from the littoral of a country bordering on the Gulf, that they were now free from the scourge of yellow fever; when he replied, "Oh, are we?" and his smile brought home to me that it was not quite as we had hoped.

Like other controlled ailments, it is ready to proclaim itself again. Small-pox requires constant vigilance; typhoid necessitates an army of sanitary officials to be ever on the watch; typhus is in the same category, and it can scarcely be said that any disease is eradicated completely from amongst us in Britain. Plague, cholera, hydrophobia, and even leprosy have to be watched constantly and thwarted by all means in our power by constant vigilance.

We are left with several ailments that show no signs of waning in their virulence; deadly epidemic ailments, such as scarlet fever and measles, which still seem uncontrollable and impossible to eradicate. The reason for this is stated to be that no micro-organism has been found and therefore little or nothing can be done. This shows the state we have attained in medicine. The diseases supposed to be due to ultra-microscopic organisms are placed outside the pale of cure by scientific therapeutic measures, and these must wait until a micro-organism is found before any definite study can be made or a hope entertained of any "anti" measures being adopted or curative sera being thought of.

One naturally inquires, did our forebears wait for the discovery of the malaria parasite before putting up mosquito nets? Did Gorgas wait for the yellow fever ultra-microscopic germ before clearing Cuba of disease? Did Jenner wait for the small-pox germ to be demonstrated before adopting vaccination as a preventative measure? And how about diseases that may not be due primarily to organisms but to physico-chemical changes? Are there any such? The "organism" enthusiasts will have none of them, but wait with folded hands and do nothing. If organisms are not to be found then we must bear with such ailments and not waste time trying to eradicate them. Organism-produced diseases hold the field at present, but by-and-bye we may go beyond the commonplace of present-day methods and take cognizance of possible chemico-toxic products and poisons which may be destroyed by treatment directed to decompose the poisoning salts within the circulation. We are far off such an ideal, as we have nothing but a mere smattering of knowledge of the pathological chemistry of the

blood and tissues. Until our knowledge is advanced beyond that stage the treatment is merely of an empirical character, having no basis on which to found the principles of a stable method of therapeutics.

When Professor Fraser bethought of the willow and its chemical ingredients being applied to the treatment of rheumatism in its various forms and added salicylates to our armamentarium, a step in the right direction was taken; and although the idea was not fostered by a study of what the chemical constituents of the blood in rheumatism or rheumatic fever are and what was required to alter them, yet it is a beginning, and as the principles of Jenner's vaccine lay dormant for over a century before they were extended to ailments other than small-pox, so we hope Fraser's discovery may form the basis to an increase in our knowledge of what are said to be ultra-microscopic-organism-produced diseases.

The axiom at the present day seems to be "all febrile and many other ailments are germ produced." Some enthusiasts state that such a condition as gout is due to an organism the carrier of which has yet to be found; the belief in the relation of disease to infection by micro-organisms and their carriers has proved one of the greatest advances in the history of medicine, but it is well to admit that there are other fields to be investigated. After all there are such things as chemical antidotes; an acid is an antidote to an alkali, and in the treatment of poisoning, salts obtained from various sources of the animal, vegetal and mineral kingdoms are used as antidotes. This seems an infantile argument and a babyish statement to make, but it is well to be brought back to first principles occasionally even when they appear too self-evident to require re-annunciation.

Hunting for organisms by the microscope is an easy path to glory compared with the complicated study of physiological chemistry; few prefer the latter, partly from want of knowledge of organic chemistry, also from our imperfect knowledge of physiology, but mostly from the time and labour involved in the pursuit of knowledge from these standpoints. Time alone will fill the great hiatus in the study of disease along these paths. After all the study of anatomy and chemistry are the foundations of modern medicine, and training in both must be thorough, earnest, penetrating as are sun rays, to be followed with the alleviation of disease as their ultimate goal.

Remarks on the Bionomics of Ornithodoros moubata (J. Rodhain, *Annales de la Société Belge de Med. Trop.*, November, 1920).—In this third note on the subject, the author details the experiments by which he found that the tick *Ornithodoros moubata* will, when deprived of a warm-blooded host, feed on the blood of reptiles, snakes, or geckos. The observation is of considerable importance in explaining the persistence of the species in districts abandoned by man.

Annotations.

The Action of Ammoniated Sulphate of Copper in Yaws (R. Van Nitsen, *Annales de la Société Belge de Médecine Tropicale*, No. 1, November, 1920).—The author has made experiments in the treatment of yaws with ammoniated sulphate of copper, and gives the results of twenty cases of yaws so treated—five of secondary and fifteen of tertiary yaws. He notes that intravenous injections are well tolerated and has no accident to record. The doses given varied from 10 to 40 cg. Series of injections may be given covering three, four, or six weeks and longer without inconvenience. Ammoniated sulphate of copper, like arsenic, pot. iodid., tartar emetic and sublimate gives only an apparent cure, and does not protect the patient from relapses.

Cases of Yellow Fever observed at Matadi (Belgian Congo) in 1917 (G. Deprez, *Annales de la Société Belge de Médecine Tropicale*, No. 1, November, 1920).—It was stated at the Congress of the British Medical Association at Birmingham, July 27, 1917, that yellow fever is endemic in several regions of the West Coast of Africa. An epidemic which broke out at the port of Matadi (Belgian Congo) raises the question whether it was due to infection from a foreign source or to endemic infection.

The native population appears to enjoy a natural immunity from this disease, and the outbreak was confined to Europeans. The author details six cases which came under his observation, four of which terminated fatally. No hæmatozoaires were found in the blood, and all the patients had taken quinine regularly. Five of the cases had bilious and black vomit. Icterus appeared during the course of the disease and increased progressively; the appearance of all the patients showed the same features. All the cases occurred within a radius of 150 metres; two of them were from the same house, thirteen days intervening between the two. There was no rainfall during the outbreak, and this fact, coupled with the prophylactic measures immediately taken, probably prevented the epidemic from extending further. The two cases which recovered were treated with injections of neosalvarsan, which drug seemed to be the most effective for this malady.

Notes on Larva of Equine Gastrophiles (L. Gedoëst, *Annales de la Société Belge de Méd. Trop.*, No. 1, November, 1920).—The author gives a detailed description of the following: *Gastrophilus intestinalis* (De Geer, 1776), *Gastrophilus hermorrhoidalis* (Linne, 1761), *Rhino-gastrophilus veterinus* (Clark, 1797). He considers that *Rhino-gastrophilus veterinus* constitutes a type very distinct from other equine gastrophiles, and his opinion appears to be supported by a recent paper by Milke, T. Joan.

Abstracts and Reprints.

THE PREVENTION OF DIABETES MELLITUS¹.

By R. T. WILLIAMSON, M.D.

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WE cannot claim to be able definitely to prevent diabetes; we do not know its exact pathology, even if we assume it to be usually associated with pancreatic changes. But we know certain facts about the ætiology, so I think we can do something to check or at least postpone the onset of the disease.

If we consider the ætiology of diabetes we find frequently: (1) a family history of the disease (22 per cent. of my own cases); or (2) a history of great excess of sweet food or sweet drinks previous to the onset of diabetes (31 per cent. of my own cases); or (3) a history of great and prolonged mental anxiety, or prolonged mental overstrain, or sudden very great mental shock, just before the onset of the disease (40 per cent. of my own cases).

As regards the injurious effect of prolonged excess of sugar the following considerations are of interest:—

(1) Experimentally, by the great excess of sugar, temporary slight glycosuria can be produced in healthy men; but this does not follow a diet of starchy food, since in healthy persons the power of assimilation for starch appears to be unlimited.

According to von Noorden, the following are the quantities of the various forms of sugar which must be taken by healthy men before glycosuria occurs:—

Grape sugar	180 to 250	gm.
Fruit	„ about 200	„
Cane	„ 150 to 200	„
Milk	„ over 120	„

To produce this alimentary glycosuria, the sugar should be given at one dose early in the morning before breakfast.

The sugar appears in the urine from three-quarters of an hour to one hour after the administration of the glucose, and the excretion thereof continues from one to three hours.

The occurrence of alimentary glycosuria depends not only on the quantity of glucose taken, but also on the rapidity of absorption. One large dose of glucose on an empty stomach may cause glycosuria, but when this quantity is divided into three portions, and taken separately in the course of an hour, the urine may remain free from sugar.

Alcohol is said to increase the risk of alimentary glycosuria.

In many affections, alimentary glycosuria is produced with smaller quantities of glucose than in health, as in Graves' disease, neurasthenia, traumatic neurosis.

(2) In certain countries, where large quantities of sugar and sweet food are taken, the death-rate from diabetes is particularly high. (Malta, certain parts of the United States, &c.)

From a consideration of what we know of the

¹Abstracted from the *Practitioner*, No. 628, vol. cv, No. 4, October, 1920.

ætiology of diabetes the following *recommendations* appeared justified with a view to postponing the onset of the disease, or possibly preventing it:—

(1) It is desirable for all, even for those who are in good health and have no grounds for fearing diabetes, to avoid *great* excess of sugar, jam, sweets, chocolates, sweet foods and sweet drinks.

(2) If, through family history of diabetes, race tendency to the disease, or on other grounds, the onset of diabetes is feared, but sugar has never been detected in the urine, then the following precautions appear advisable:—

The amount of sugar in the diet should be restricted.

Sugar should not be added to any food or drink. Coffee and tea, puddings, &c., should all be taken without sugar. All *very* sweet food, *very* sweet fruits, and *very* sweet drinks, and all articles containing *much* sugar, should generally be avoided (such as honey, syrup, treacle, dried sweet fruits, figs, dates, raisins, currants, prunes, jams, marmalade, chocolates and sweets of all kinds; sweet drinks such as port, Tokay, champagne, and other sweet wines; whisky and sugar, gin and sugar, herb-beer, liqueurs, fruit juices and syrups, cocktails, gin and ginger beer). Sweet lemonade and cider should be taken only in small amounts.

Excess of alcohol should be avoided carefully, especially excess of beer and alcoholic beverages containing much sugar. Excess of alcohol probably increases the risk of diabetes in certain cases. Food or drinks containing only small quantities of sugar may be safely taken by this class of cases. Starchy food and starch carbohydrates may be taken in the usual quantities.

Excess of food should be avoided, since this is probably a predisposing cause in some cases.

Sufficient physical exercise is very important.

Excessive brain-work and severe brain-strain should be avoided if possible.

Probably several of these factors play an important part in the ætiology of diabetes amongst the Hebrew race. Often the Hebrew diabetics have taken excess of food, and often excess of sweet food; frequently, they are very stout, have taken very little exercise, and have done excessive mental work.

(3) If sugar has been found in the urine once, and has then disappeared, it is desirable to determine if the power of sugar-destruction is diminished.

A common method is to give 100 gm. of glucose dissolved in a quarter of a litre of water or tea which is taken on an empty stomach before breakfast. If the power of sugar-destruction is diminished, sugar is found in the urine from half an hour to three hours afterwards. If the power of sugar-destruction is normal, the urine will be free from sugar after this dose of glucose.

A convenient though less accurate way is by the mid-day meal of half-a-pound to one pound of sweet grapes. The bladder is emptied just before the meal. Then urine is passed about an hour and a half and again three hours after the meal. If samples of each fail to reduce Fehling's solution, the power of sugar-destruction is normal and not reduced. If one or both contain sugar, the power of sugar-destruction may be considered diminished.

If the glycosuria has been temporary and of very

short duration, and the power of sugar-destruction is not diminished, then it is only necessary to cut off all sugar and all sweet food and all sweet drink and to follow the other recommendations just given. But reduction of starch food is not necessary.

(4) If the glycosuria is temporary, but the power of sugar-destruction is diminished, then all sugar and all food or drinks containing sugar should be cut off from the diet as in diabetes. Also the amount of starchy carbohydrates should be diminished, but bread may be allowed in ordinary amount, with a small quantity of other carbohydrate food.

(5) If the glycosuria is intermittent, or permanent but slight, then the treatment suitable for a mild diabetes should be followed. The ordinary rigid solid diabetic diet may be tried for a short time, but if this fails to check the glycosuria promptly, then other treatment should be carried out (such as the egg and cream diet, or the casein and cream diet, or the milk and egg diet, or the vegetable and jelly diet, for seven days, and the treatment carried out afterwards as in a case of mild diabetes).

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.
No. 1. January, 1921.

On Venomous Snake-destroying Animals (A. Calmette).—The writer proposes the use of Nature's own forces to protect man from his natural enemy, the venomous snake. He considers that this might be done in Guiana and the Antilles by importing and acclimatizing *Guacabo* and *Culabreco* birds from Colombia and Venezuela. In warm, damp regions where dangerous vipers abound, such as certain parts of India and Burnah, the *Mussurana* snake from Brazil, which appears to feed exclusively on the large Viperidæ and Crotalinæ, but is harmless for man, might be used. As the *Mussurana* possesses an enemy in its own country in the form of Colubridæ of the genus *Elaps*, organized methods of cultivation would be necessary to produce sufficient quantities to render attempts at acclimatization abroad successful. The Indian mongoose is less suitable for the purpose, for, although it will attack venomous snakes when hungry, it prefers a diet of rats, birds' eggs and feathered game, and is apt to cause ravages in poultry yards while leaving its official prey in peace.

Dog Madness in French West Africa (G. Bouffard).—As in other parts of French West Africa, a disease clinically identical with the rabies of European dogs is fairly common in Dahomey, though hydrophobia in man is unknown. The virus proved fatal for a large number of rabbits and guinea-pigs inoculated by the author, but he did not succeed in cultivating it. He urges the desirability of devising means of transporting the African virus in order that it may be studied comparatively with the virus of rabies, and the problem solved as to whether the two are identical when placed under similar conditions as regards climate, electric tension, light, &c.

Vaccination against Cattle Plague by Schein's Process (P. Croveri).—A comparison between the results obtained by the Schein and by the Kolle and Turner processes, favourable to the latter, having been criticized by Schein (Croveri, *Bull. Soc. Path. Ex.*, October, 1919; Schein, *Bull. Soc. Path. Ex.*, May, 1920), the writer amplifies his previous brief report to justify his conclusions. He points out, however, that in Italian Somaliland, where his tests were carried out, the mortality would appear to be so much greater than in Indo-China, the field of Schein's operations, as to suggest a difference in the virus and possibly also in the susceptibility of the animals exposed to infection.

Three more Cases of Leprosy at Algiers (J. Montpellier).—The cases are given as supplementary to a previous paper in which the author showed that in none of the hundred or so instances of leprosy observed among Europeans in Algeria could the disease be proved to have been contracted in the colony. In the first of the three new cases the infection was clearly imported. The second was that of a man born in Algeria of Spanish parents from Alicante, the region whence the majority of Algerian lepers are derived. No information could be obtained concerning the parents of the patient except that both died young, and the infection was not improbably hereditary. In the third case it was impossible to trace the origin of the contagion. The subject was a Frenchwoman from Cantal, who emigrated to Algeria at the age of 20, but returned to France for some weeks each year. After living at an isolated farm, she removed to the town of Algiers, and eight years later developed symptoms of leprosy. Taking all the possibilities into consideration, the author is inclined to the view that the disease was more probably contracted in Cantal than in Algeria.

The Cysticeroid of Hemidactylus turciensis Lin. (Georges Blanc and Jean Caminopetros).—In three specimens of the gecko *Hemidactylus turciensis*, captured in an old wall in Athens, the writers found a cysticeroid identical with that isolated by Marchi from the intestinal walls of *Tarentola mauritanica*. In four other specimens caught at some distance from any human habitation no trace of the parasite was seen—a fact tending to confirm the theory that geckoes only become infected near houses. Though there is no doubt that cats are the ultimate hosts of the cysticeroid in question, the authors think it would be interesting to continue Marchi's experiments on the *Strix* (*Athene*) *noctua* owl, a nocturnal bird of prey in which it may also quite possibly develop.

On the Identification of Phlebotomi found in France (A. Parrot).—Manson's recent statement that phlebotomi seen in France have always been *P. papasii* would appear to be incorrect, for F. Larrousse has recorded the finding of *P. perniciosus* Newstead in the Alpes Maritimes. The specimen described is apparently identical with the latter,

except in showing two geniculated spines on the fifth article of the antenna only instead of on all the articles from III to XV inclusive—a detail so unusual as to be probably erroneous. The author concludes by emphasizing the necessity for adopting a systematic method of describing these flies, in order that the specimens collected may be more effectively used for acquiring a better knowledge of the genus.

On the Specific Determination of a Female Phlebotomus (C. França).—Like Parrot, França considers the female phlebotomus found by Manson at Bron (Rhône) to be *P. perniciosus*. The European phlebotomi may, he adds, be diagnosed differentially as follows:—

Wing	$\begin{cases} a < \beta \\ a > \beta \end{cases}$	$\begin{cases} P. minutus \\ P. papatasii, sergenti \text{ and } perniciosus \end{cases}$
Colour of fly:—		
Brown or greyish	$\begin{cases} \text{Antennae: III} > \text{IV} + \text{V} \\ \text{IV} + \text{V} + \text{VI} < \text{XII} + \dots + \text{XVI} \\ \text{Palpi: V} > \text{II} + \text{III} \end{cases}$	$\left. \begin{array}{l} \\ \\ \end{array} \right\} \text{perniciosus}$
Yellowish-brown	$\begin{cases} \text{Antennae: III} = \text{IV} + \text{V} \\ \text{IV} + \text{V} + \text{VI} < \text{XII} + \dots + \text{XVI} \\ \text{Palpi: V} < \text{II} + \text{III} \end{cases}$	$\left. \begin{array}{l} \\ \\ \end{array} \right\} \text{papatasi}$
	$\begin{cases} \text{Antennae: III} > \text{IV} + \text{V} \\ \text{IV} + \text{V} + \text{VI} = \text{XII} + \dots + \text{XVI} \\ \text{Palpi: V} < \text{II} + \text{III} \end{cases}$	$\left. \begin{array}{l} \\ \\ \end{array} \right\} \text{sergenti}$

Presence of Ornithodoros talaje (Guérin-Mèneville 1849) at Fez. *Pathogenic Action on Man* (R. Martial and G. Senevet).—The tick was judged to be *Ornithodoros talaje* from the following characteristics: Shape of the body, which was rounded towards the back and somewhat conical in front, absence of eyes, granulated tegument, presence of disks visible to the naked eye, and, in particular, mobile "cheeks" situated in the antero-external part of the camerostome capable of covering the mouth parts more or less completely. Two travellers sleeping in an Arab house were bitten by these insects. Papules, accompanied by violent pruritus, appeared at the points attacked, each papule showing the bite in the centre. The pruritus lasted four weeks and then gradually disappeared; five months later pigmented areas still marked the site of the papules. The more severely bitten person developed general symptoms, which remained for a fortnight, and consisted of fever, nausea, prostration and weak pulse. Pigeons, of whom a hundred or so lived in holes in the house walls, were presumed to be responsible for the presence of the tick.

Medical News.

New Principal of Livingstone College.—The Committee of Livingstone College recently accepted with much regret the resignation of Dr. Loftus E. Wigram of his post as Principal of the College on grounds of health. Dr. Tom Jays, who has served since October, 1919, as Vice-President, has been appointed as his successor.

Medical Activities in Palestine.—A Jewish Medical Association has been formed in Palestine, and there has just appeared the first issue of its journal, under the heading of *Harefoah* (Medicine).

Original Communications.

LABORATORY OBSERVATIONS ON LATENT MALARIA IN SOLDIERS RETURNED TO ENGLAND, THEIR RELATION TO CLINICAL OBSERVATIONS AND THE VALUE OF THE LARGE MONONUCLEAR CELL COUNT. THE TEST FOR QUININE IN URINE.

By Dr. W. BROUGHTON-ALCOCK, D.C.M.S. Pathology.

Central Laboratory, London Region, Ministry of Pensions.

THE recent investigations carried out at the Central Laboratory, Ministry of Pensions, on the pensioners who contracted malaria during the late war has led to interesting findings from which an extended series of tables were prepared and put forward at a meeting of the Tropical Diseases and Parasitology Section of the Royal Society of Medicine on April 4 last. The purpose of this paper is to give in summarized form some of the salient findings recounted and discussed on that occasion.

The prevalence of this disease, with its death and invaliding rôle in so many parts throughout the world, stimulates any researches in the hope of further fruitful issues towards unravelling its complexities and in the interests of the human race. We had presented the unique opportunity of studying cases who contracted malaria in tropical or subtropical regions and returned to the temperate climate of England in the returned soldiers. The work carried out has been collaborative, one in which I have had the assistance of my colleagues, Dr. Lucey, Dr. Fry, Dr. Roche Lynch and Dr. Haig, and experienced laboratory assistants. Collaboration with Sir Ronald Ross and clinicians of long previous experience of malaria cases in endemic areas has been a most important and advantageous factor in furthering our researches and calls for our gratitude to them.

Two practical points with which we were concerned and with which I propose to deal in this paper are:—

(1) The diagnosis of latent malaria in Europeans who have returned from tropical and subtropical regions.

(2) The determination of radical cure.

Researches have been directed with special regard to:—

(1) Search for the parasites or presence of malarial pigment.

(2) Study of the white blood corpuscles, and especially the relative percentage of the large mononuclear leucocyte.

(3) Relation of the laboratory results to the clinical findings.

Regarding No. (1).—The time allotted to each stained film for search before pronouncing a negative result was fifteen minutes, save when one was encouraged to continue by such a note as spleen enlarged in the clinical findings which accompanied the blood film, or by the presence of a large mononucleosis. The importance of finding

the plasmodium is paramount, as the only unquestionable laboratory method of diagnosing malaria in the pensioner is the finding of the parasite or the pigment formed by it. The detection of pigment, it may be added, was in this series of cases very rare. At first a thick and thin blood film of each case was examined, but ere long a regular bordered and even thin film was adopted as most advantageous in routine work of such proportion.

Regarding No. (2).—The technique of blood taking and film preparation extensively investigated by Dr. Lucey has brought out the importance of and necessary attention to technique before reliable findings can be assured. An important point to note is that the first drop of blood from the ear not infrequently contains an erroneous increased percentage figure in the number of the large mononuclear leucocyte.

In order to ensure comparable findings and eliminate possible fallacies in blood films for differential counts, the following technique is recommended. A small drop of blood to be taken from the finger and evenly and slowly spread (using a second slide or coverslip) as a thin film with regular borders not reaching the edges of the slide and the end of the film not reaching the end of the slide. After staining at least 200, and preferably 400, cells should be counted one quarter at each edge and the remaining half in the central portion of the film. Large lymphocytes must not be included in a count of the large mononuclear leucocyte.

As to the relative percentage of large mononuclear leucocytes that constitutes an increase there is diversity of opinion, and few authors state the minimum figure. This point calls for authoritative definition. You will observe in my tables that I have compiled the findings on the basis of 10 as well as of 15 as a minimum percentage figure. In taking the lower figure I was influenced by several factors, viz., that, should the relative large mononucleosis prove out a constant in latent malaria and have a value at this figure in the diagnosis an advantage would be gained and the pensioners would not fail to be benefited in their assessment and opportunity for treatment; also that the percentage of large mononuclear leucocyte in the normal person has quite a wide range and 10 per cent. is a rare finding in the film of a drop of blood taken from the finger. Response varies in the individual and an increase from a lower figure to 10 may signify as much in one individual as a response to 15 in another. Again, with the return of the soldier to a temperate zone and better conditions of life and food one finds amelioration of the disease and more readily acquired immunity in the vast majority of cases; and might the large mononucleosis be less developed in latent malaria under these more favourable conditions, and with the accompanying weakened virulence and progressive elimination of the parasite?

The basis of 15 per cent. was taken as that fixed upon by Stevens and Christophers in the tropics and now generally accepted.

TABLE SHOWING THE BLOOD CELL FINDINGS, ASSOCIATED CLINICAL CONDITION PRESENT, AND PROPORTION IN WHICH PARASITES WERE FOUND IN RELATION TO A CLINICAL STATE.

TABLE 1A. 801 CASES.

Clinical Condition.	Number of Cases.	BLOOD FINDINGS.				RELATED CLINICAL CONDITIONS.						MALARIAL PARASITES.			
		Relative increase of L.M. 10% and over.	Relative increase of L. 31% and over.	Combined relative increase of L.M. and L.	No relative increase of L.M. or L.	LIVER.		ANEMIA.		HEART.		P.v.	P.f.	P.m.	No Parasites found.
		(a)	(b)	(c)	(d)	Enlarged.	Normal.	Present.	Absent.	Abnormal.	Normal.				
Enlarged SPLEEN	127	41.7	46.5	18.1	29.9	15.7	84.3	26.8	73.2	4.7	95.3	14.2			85.8
Normal	674	36.8	46.7	16.1	32.6	4.8	95.2	8.9	91.1	2.4	97.6	1.3			98.7
Enlarged LIVER	52	34.6	53.8	19.2	30.8	SPLEEN. Enlarged. Normal.		17.3	82.7	7.7	92.3	3.9			96.1
	749	37.8	46.2	16.3	32.3	14.3	85.7	11.4	88.6	2.1	97.7	3.4			96.6
Present ANEMIA	94	31.0	46.8	10.6	29.8	36.2	63.8	9.6	90.4	9.6	90.4	11.7			88.3
	707	38.0	46.6	17.2	32.6	13.1	86.9	6.1	93.9	1.9	98.1	2.3			97.7
Abnormal HEART	22	27.3	54.5	18.2	36.4	27.2	72.8	18.2	81.8	40.9	59.1	4.6			95.4
	779	37.8	46.5	16.4	32.1	15.5	84.5	6.2	93.8	11.0	89.0	3.4			96.6

The figures contained in column (c) are included in figures contained in columns (a) and (b).
Abnormal signifies:—Tachycardia, Hæmic Murmur, Dilatation, D.A.H.

TABLE SHOWING THE CLINICAL OBSERVATIONS, BLOOD CELL FINDINGS AND PROPORTION OF PARASITES FOUND IN RELATION TO THE PERIOD OF TIME SINCE THE FIRST APPEARANCE OF SYMPTOMS.

TABLE 1c. 819 CASES.

Date of first attack.	Number of cases.	CLINICAL OBSERVATIONS.						BLOOD FINDINGS.					MALARIAL PARASITES.			
		Clinical Condition.	SPLEEN.	LIVER.	Clinical Condition.	ANEMIA.	Clinical Condition.	HEART.	Relative increase of L.M. 10% or over. (a)	Relative increase of L. 31% or over. (b)	Combined relative increase of L.M. and L. (c)	No relative increase of L.M. or L.	P.v.	P.f.	P.m.	No Parasites found.
6 months	18	Enlarged	38.9	5.5	Present	27.7	Abnormal	11.1	55.5	38.9	11.1	16.7	33.3			66.7
		Normal	61.1	94.5	Absent	72.3	Normal	88.9								
1 year	48	Enlarged	35.4	4.2	Present	20.8	Abnormal	4.2	33.3	54.2	12.5	25.0	28.3			91.7
		Normal	64.6	95.8	Absent	79.2	Normal	95.8								
2 years	133	Enlarged	15.0	3.7	Present	14.3	Abnormal	5.3	37.7	49.6	16.6	29.3	4.5			95.5
		Normal	85.0	96.3	Absent	85.7	Normal	94.7								
3 years or over	620	Enlarged	14.5	7.3	Present	10.5	Abnormal	2.1	37.9	45.4	16.7	33.4	2.7			97.3
		Normal	85.5	92.7	Absent	89.5	Normal	97.9								

The figures contained in column (c) are included in figures contained in columns (a) and (b).
Abnormal signifies:—Tachycardia, Hæmic Murmur, Dilatation, D.A.H.

RECORDED AREA OF INSPECTION.	TOTAL NUMBER OF CASES EXAMINED.	TOTAL POSITIVE FINDINGS.				CASES FOUND POSITIVE ON ONE OCCASION ONLY.			CASES FOUND POSITIVE ON MORE THAN ONE OCCASION.	
		NUMBER	TYPE OF PARASITE.			1st exam. positive subsequent exam. negative.	1st exam. negative subsequent exam. positive.	Positive on lat exam. and not returning for subsequent exam.	Same type of Parasite found.	Different type of Parasite found.
			P.v.	P.t.	P.m.					
1-Palestine	1334	27	27	—	12	9	5	1	—	
2-Mesopotamia	1646	117	115	—	57	29	21	10	—	
3-India	2372	152	148a	1a	67	28	35	21	1	
4-Egypt	1545	39	39	—	22	6	8	3	—	
5-S. Africa	112	1	1	—	1	—	—	—	—	
6-E. Africa	1298	23	23	—	10	7	5	1	—	
7-W. Africa	140	1	1	—	—	—	—	1	—	
8-Balkans	11951	209	207	1	99	46	47	17	—	
9-Malta	19	1	1	—	1	—	—	—	—	
10-Italy	133	12	12	—	4	6	2	—	—	
11-Asia Minor	82	4	—	—	2	1	1	—	—	
12-S. Russia	193	41	39b	1	21	3	11	4	2	
13-Syria	50	4	—	—	3	1	—	—	—	
14-Persia	79	7	6	1	5	—	2	—	—	
15-Thurkey	70	5	5	—	2	—	3	—	—	
16-W. Indies	8	1	1	—	1	—	—	—	—	
17-Aden	1	1	—	—	—	—	1	—	—	
18-Gallipoli	218	3	3	—	2	—	1	—	—	
19-England	100	3	3	—	2	1	—	—	—	
20-Cyprus	1	1	1	—	1	—	—	—	—	
21-France	136	1	1	—	—	—	—	—	—	
22-Germany	4	—	—	—	—	—	—	—	—	
23-Indefinitely recorded	6161	128	120	1	—	—	—	—	—	
TOTALS	29270	777	759	14	4	1	—	—	—	

POSITIVE FINDINGS AND PERIOD AFTER RETURNS OF THE PENSIONER TO RESIDENCE IN ENGLAND.																																			
1 mon	2 mon	3 mon	4 mon	5 mon	6 mon	7 mon	8 mon	9 mon	10 mon	11 mon	12 mon	13 mon	14 mon	15 mon	16 mon	17 mon	18 mon	19 mon	20 mon	21 mon	22 mon	23 mon	24 mon	25 mon	27 mon	28 mon	29 mon	31 mon	33 mon	36 mon	39 mon	41 mon	43 mon	51 mon	59 mon
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	31	33	36	39	41	43	51	59
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	31	33	36	39	41	43	51	59
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	31	33	36	39	41	43	51	59
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	31	33	36	39	41	43	51	59
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	31	33	36	39	41	43	51	59
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	31	33	36	39	41	43	51	59
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	31	33	36	39	41	43	51	59
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	31	33	36	39	41	43	51	59
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	31	33	36	39	41	43	51	59
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	31	33	36</					

These authors from a study of the blood cell counts of a considerable number of Europeans living in the tropics found that an increase beyond 15 per cent. of the large mononuclear forms is proof of an actual or recent malarial infection. This change, which is usually very pronounced in the apyretic periods of an attack of malaria is, however, most frequently absent during pyretic periods. As I presume infection with one brood of parasite is implied, for the relative increase appears to be to some degree dependent on the age of the parasite these deductions held good in recently infected cases I examined in the Mediterranean littoral. I should only like to add that following quinine treatment and subsidence of symptoms and disappearance of the parasite from the blood-stream in cases that have returned home the large mononuclear increase was not found with any constancy after the few days following a symptomatic attack.

Our work on pensioners is in fact an extension of their studies and is applied to latent malaria, with comparatively few cases of acute symptomatic relapses at the time of examinations, in Europeans who have returned from tropical and subtropical regions. Unhappily in an out-patient clinic one cannot get blood examinations in the day-to-day sequence one would wish, and uncontrollable factors such as reliability of many of the pensioners in their statements and irregularity of their visits also handicaps scientific investigations of a further detailed nature than we have done.

Amongst the many authoritative publications since the original work of Stephens and Christophers and of Kelsch, H. Vincent and Billet, one finds such a statement as "This mononucleosis is observed for a long time after an attack of fever," or "In hæmatological infections, such as malaria, the blood picture is usually definite." I presume these statements apply to cases of latent malaria in tropical or subtropical endemic areas. The point I wish to bring forward is that they are accepted as applicable by a majority of our clinicians in Great Britain, and their diagnosis of latent malaria is not infrequently influenced by the presence or absence of a relative large mononucleosis. Justification for this is not supported by our findings; and the question is one not only of scientific interest, but of great practical bearing on treatment.

On this point I cite for its appropriate interest a paragraph from a recent publication, *Bulletin de la Société des maladies tropicales*, February, 1921, by Dr. J. Rieux, chef du laboratoire Val de Grace, the Military Hospital of Paris, who has been investigating similar cases to those comprising my series, but in the French Army: "Or, l'étude de la formule leucocytaire des anciens paludéens de ceux qui font l'objet de cette étude, montre monocytes, lymphocytes et éosinophiles reviennent au taux normal en même temps que disparaissent du sang les hématozoaires et que cessent les accès fébriles. Seul le taux des neutrophiles accuse pendant plusieurs mois, pendant un an et même davantage après cette période, une diminution toujours notable."

Regarding investigation No. 3, I solicit your reference to Tables 1A and 1c. In these I must first note that the leucocytolytic action of quinine may be eliminated as a factor in the white cell formula found. The findings are from examinations made at the first visit of the pensioner-claimant to the Tropical Diseases Clinic. The clinical observations are those of three very experienced clinicians, who have unremittingly and enthusiastically collaborated and given us with each film a record of the case. Tables were primarily prepared monthly but no distinctive differences were noted, and all cases from June, 1920, to February, 1921, are embodied. It was not possible to make total white cell counts. Related findings of lymphocytes are added, and the percentage of polymorphonuclear cells may be deducted.

I have given only the table worked out on the figure of a relative increase of large mononuclear cells at the figure of 10 per cent. or over. Space does not permit of publishing also a table with the figure of 15 per cent. or over, which has also been prepared. The number of cases showing this higher percentage is of course smaller, but the conclusions to be drawn from it do not contradict those to be drawn from that based on the 10 per cent. figure.

Tables 1A and 1c.—Table 1A is to be considered with Table 1c.

An outstanding conclusion to be drawn from these tables is that a relative increase of large mononuclear cells is not a constant factor in latent malaria even when the most reliable diagnostic clinical sign, an enlarged spleen, is present and the clinical diagnosis of latent malaria is clear. Noteworthy also is the fall in the percentage of findings of the parasite and of clinical signs, enlargement of spleen, presence of anæmia, cardiac abnormality as time lengthened from the date of the first attack of malaria.

Table 3 has been prepared with twofold purpose: (a) to record the number of cases examined from each endemic area and proportion of positive findings therein, and (b) to glean some knowledge on the persistence of the parasite, and any regional variation in this persistence of the plasmodium in the body after their return to England. This table is, I trust, readily interpretable. The findings grouped under (b) are further interesting when compared with those made by Dr. Rieux on pensioners in France. In his conclusion he states: "Il nous paraît qu'on est dès lors autorisé à dire que les manifestations vraies du paludisme, chez des malades soustraits par le retour en France à toute infection nouvelle et bien traités, durent environ une année et qu'après elle la guérison de la maladie est faite."

The last point with which I have to deal, and I shall touch upon it in only a general way, is the value of the test for quinine in urine in the control of out-patients, a test with which are associated the names of Ramsden and Lipkin, and Nierenstein among others. The moral influence on patients who know that their veracity as to taking

quinine can be questioned is striking. This laboratory test has been found very reliable, and I only wish to make further known its advantages to the clinician, as upon our findings he has been able to maintain more regular and efficient treatment of patients needing it, and aided in weeding out malingers. We have modified the technique of the direct Tanret's or Mayer's test by previously acidulating the urine to not more than 2 per cent. with acetic acid, as this has been found by Roche Lynch to give a positive finding in a much higher dilution of quinine in the urine, especially if the urine be previously alkaline. Our period of time taken for practical application of the test is three to eighteen hours after the official dose of 10 gr. of quinine is taken orally, or to seven hours after taking a dose of 5 gr. The taking of repeated daily doses prolongs this limit.

Our gratitude is due and expressed to the Commissioner and Assistant Commissioners, London Region, Ministry of Pensions, and to the D.C.M.S. Tropical Diseases Clinic, for their unremitting interest and assistance in the carrying out of this work.

THE SYMPTOMATOLOGY AND TREATMENT OF LEPROSY.¹

By DR PHILIP HOOPER.

LEPROSY occurs in Fiji as elsewhere in definite foci, the disease being contracted directly from a leper. Cases such as those recorded by Ashburton Thompson of persons developing leprosy though never having been in conscious proximity to a leper are explicable by the fact that a leper is often infective long before any doctor who has not had special experience of the disease can make a diagnosis and still longer before his condition is such as to give rise to a suspicion among laymen. Fijians are exceedingly quick to recognize the disease—the disease has existed amongst them from the earliest times, and they have special Fijian names for all the prominent symptoms. The keynote for the prevention of leprosy is early diagnosis. Moreover early diagnosis is almost essential for cure.

The division of cases into nodular and nerve is apt to obscure the symptomatology of the disease because, although cases of pure nerve leprosy are common, there is no such thing as pure nodular leprosy. In a case of nodular leprosy nerve symptoms are always demonstrable by careful examination.

During the last few months at Makogai forty-one cases have been examined to determine the frequency of various symptoms among the patients in the asylum. It was considered impracticable to distinguish in natives the difference between

epicritic and protopathic sensation, especially as regards the temperature sense. To test the temperature sense test-tubes of cold water and of almost boiling water were used. Pain sensation was tested by a gentle pin-prick and touch sensation by wisp of wool or by a gentle touch with a pin-head. The first sensations affected in leprosy neuritis are those of temperature, the appreciation of any difference in the sensation produced by the application of heat and cold being lost except in cases where intense heat is said to be painful though not hot. Pain sensation next disappears, the prick of a pin being painless and noticed only as a touch. Touch sensation disappears later.

In the more advanced nerve cases an immediate improvement in sensation may be brought about by cutting down on the nerve concerned, peeling the epineurium off the swollen fusiform nerve and gently stretching the nerve. This operation will also give immediate relief to the intense pain and tenderness so often felt in the nerve trunk. Records of the pulse rate and temperature have been taken in many cases, of which two are attached. One is from a Chinaman in acute reaction, the other from a very bad nodular Fijian. The morning rise in the pulse rate, first described by Honeij, has been noted in some, but not in all cases. Many chronic cases have a very rapid pulse, often due to the abuse of tobacco.

Of the 41 cases specially examined, 2 were children and 39 adults, 7 were females and 34 males, 2 were Europeans and 39 were Fijians, Indians, Solomon Islanders and Rotumans.

Twenty-nine gave a history of definite intimate association with known cases of leprosy, but as I am of opinion that fully 1 per cent. of the population of Fiji are lepers, it is certain that all forty-one cases—in fact all the inhabitants of Fiji—have run a risk of infection.

The type of disease was: Nodular, 24 cases; Nerve, 17 cases.

A single examination of the nasal mucus of each case was positive for acid-fast bacilli in twenty-one out of the forty-one cases.

The situation of the nodules or infiltrations in the twenty-four cases of frank nodular leprosy was as follows:—

Brows or forehead	...	...	17 cases
Ears	...	...	20 "
Nose	...	...	16 "
Rest of face	...	...	18 "
Body	...	...	15 "
Buttocks	...	...	9 "
Arms	...	...	13 "
Forearms	...	...	13 "
Hands	...	...	7 "
Thighs	...	...	7 "
Legs	...	...	10 "
Feet	...	...	8 "

In six cases there was loss of eyebrows without obvious macule, wheal, infiltration or nodule.

The total number of cases with macules or wheals was thirty, the distribution and nature of these lesions being shown in the following table:—

¹ An appendix to the Annual Report for the year 1920 for the Makogai Leper Asylum, Fiji.

Situation	Erythema	Superficial wheal	Depigmented Macule	Pigmented Macule
Brows	—	1	5	—
Face	1	2	8	—
Head and neck	—	—	10	—
Front of chest	—	1	15	—
Front of abdomen	—	—	13	—
Back	—	2	21	1
Buttocks	—	—	13	—
Upper limb	—	1	21	—
Lower limb	—	—	18	—

Males with definite enlargement of mammary gland numbered 9 cases; males with definite enlargement of nipple gland numbered 10 cases.

Cases with œdema of hands and fingers numbered 12 cases; of feet and toes, 21 cases.

In thirty-four cases there was definite thermæsthesia of feet and toes.

There were 3 cases of leprous conjunctivitis (and 2 doubtful), 5 cases of leprous iritis, 21 of rhinitis, 3 of laryngitis, and in 2 cases there was ulceration of palate and pharynx.

The total number of cases with glandular enlargement was twenty-three, as follows: Cervical, 1; axillary, 16; inguinal, 8; femoral, 12.

Cases of leprous ulceration, distinct from trophic or traumatic, were five in number, as follows: Of face, 2; body, 2; arms, 3; forearms, 3; hands and fingers, 3; thighs, 1; legs, 3; feet and toes, 4.

None of these forty-one cases was affected with bullæ at the time of examination. Three cases had keloid scars.

Symptoms of the affection of motor nerves were found in twenty-eight cases, as follows: Of ulnar nerve, 24 cases; facial nerve, 4; external popliteal nerve, 12; internal popliteal nerve, 5; musculo-spiral nerve, 2.

Five cases were affected with marked foot-drop, and twenty with *main en griffe*.

In thirty-six cases enlargement of a nerve or nerves was noted, as follows: Enlargement of ulnar nerve, 36 cases; enlargement of popliteal nerve, 22 cases.

Nerves may be enlarged without any marked symptoms in sensation or in power. In three cases there was definite enlargement of the ulnar nerve without symptoms discernible in the area of distribution.

Cases showing symptoms of affection of sensory nerves (but not including scattered patches of anæsthesia due probably to old macules, and not including the three cases just mentioned above) numbered thirty-seven, as follows: Of ulnar nerve, 33 cases; internal popliteal nerve, 25; external popliteal nerve, 31; median nerve, 24; radial nerve, 19; other sensory nerves, 15.

In one case it was uncertain whether the pathology of a patch of anæsthesia is old neuritis of the great auricular nerve or atrophy of nerve endings in a patch of skin formerly the seat of a leprous macule; in the latter view the case would be one of the pure skin leprosy.

There were thirty cases of contractures and deformities, as follows: Of finger, 25 cases; feet, 16; eyelids, 7.

In thirty cases there were anæsthetic patches apparently independent of macules or nerve lesions. These are probably due to old macules which have cleared up except for the anæsthesia.

In twenty cases there were marked trophic lesions, in twelve cases marked lepra mutilans of hands and in fourteen of feet. The commoner trophic lesions were absorption of the metatarsals, metacarpals, or proximal and middle phalanges. In some cases the terminal phalanx of a finger was being absorbed distally and laterally, giving a tapering appearance to the digit. In two patients there was marked inversion of the great toes, apparently due to absorption of the mesial half of the head of the first metatarsal. In five cases there were perforating ulcers, and in one case a pressure sore.

All cases were scarred. Twenty-one had been operated on for leprosy or its results. Two had been operated on for non-leprous conditions.

To sum up the diagnosis of leprosy in Fiji, there are three stages into which leprosy may be roughly divided: the macular stage without neuritis or nodules; the nerve stage with macules, past or present, but without nodules; and lastly, the nodular stage, in which neuritis is always demonstrable though macules may not have been noticed. In making a diagnosis it must be remembered that in Fiji leprosy is by far the commonest cause of neuritis of one or two or a few peripheral nerves, especially if evidenced by facial tic, facial paralysis, foot-drop, wrist-drop, *main en griffe*, a wasting of a group of muscles, ectropion, or by tenderness or enlargement of any nerve trunk (but especially the ulnar or external popliteal), and even more especially if the enlargement or affection of the nerve is accompanied by change in the temperature sense in the area of distribution of the nerve. Macules may exist without neuritis, neuritis without nodules. In erythematous macules the sense of touch and pain may be hyperæsthetic, though the temperature sense is usually lost over part of the macule. In the depigmented macule the temperature sense is lost, and usually the sensation to pain and touch is depraved or lost. In all nodular leprosy the sensation to heat and cold is lost over the feet.

Smears of serum expressed from nodules and infiltrations (the nodule being merely a more prominent and more circumscribed tumour than the infiltration) teem with masses of acid-fast bacilli. In smears of serum from macules I have never been able to discover even a single acid-fast bacillus.

Prognosis.—I consider that all cases of purely skin leprosy (i.e., such cases as are characterized only by macules without demonstrable nerve lesion or nodule formation and without acid-fast bacilli in the nasal mucus) can be cured by modern methods, that many cases of nerve leprosy can be cured, and that some nodular cases can be cured. Cure or failure will thus largely depend on early diagnosis accompanied by early treatment.

Treatment.—The favourable results of treatment in the past few years at Makogai have been due to the general hygienic treatment and to the intra-

muscular injection of chaulmoogra oil, mostly by Mercado's formula. This work could not have been accomplished without the most efficient nursing staff. During the years 1918 and 1919 twenty-three patients have been discharged on parole, of whom one has returned. We have now six more cases ready for discharge.

I have recently discovered that crude chaulmoogra oil may be given intravenously in doses of 15 minims daily for six days weekly for months on end without ill effects. Of forty cases so treated since August 21, all except two have derived benefit. In one of these two cases treatment was stopped at the end of a week owing to technical difficulties which have since been apparently surmounted as a result of the greater skill of the injection staff. The other case received only four injections, treatment being regarded as a last hope in a case of extreme nodular leprosy complicated by filariasis and nephritis. His urine on acidifying and boiling was solid with albumin.

The formulæ used for intravenous injection are two, though I have recently abandoned the iodine formula, as it is convenient to use only one mixture when, as at present, we are injecting two hundred patients daily.

R	Iodine	...	...	...	1
	Ether	...	...	...	250
	Chaulmoogra oil	...	...	...	750

and

R	Acid carbolic	...	...	...	10
	Ether	...	...	...	250
	Chaulmoogra oil	...	...	...	750

Chaulmoogra oil has been given intravenously in the most minute doses with great precautions by MM. Varham, Stevenel and Noc, but their dosage was about one-fortieth that employed by me, and the drug was given far less frequently. Their technique was very complicated.

My experience is that dosage may start with 10 minims of the above mixtures for adults, and may be increased gradually to 20 minims without ill effects. This dose is given daily for six days a week and may be continued for at least five months on end.

Children take relatively large doses; one advanced nodular case, an Indian female, aged perhaps 9 years, has for several weeks been taking 20 minims. The effects of the injection are:—

Immediate Results.—Taste of ether, taste of chaulmoogra oil, flushing of face, acceleration of respiration and pulse, cough (in some cases).

Later Results.—Rise of temperature and pulse rate reaching maximum about four hours after injection and ending eight hours after injection. A typical half-hourly chart of temperature and pulse is shown below. Slight drowsiness; leucocytosis.

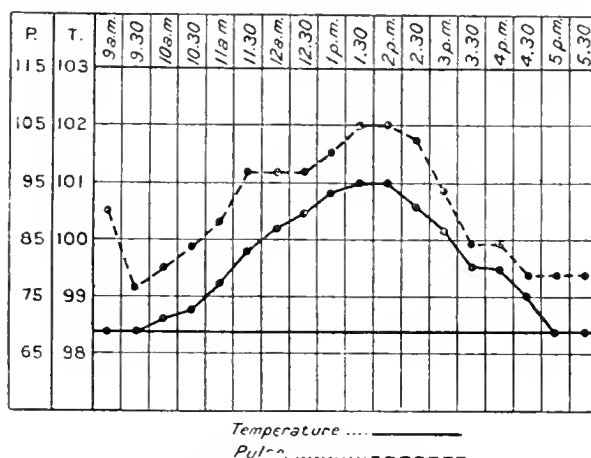
Curative Results.—Although the treatment has been on trial only a little over four months the improvement in the cases treated is undoubted. The first cases taken were those whose condition was regarded as absolutely hopeless. Later, cases were added which, though not so advanced, were retrogressing.

Photographs were taken of some of the cases and fairly full notes of most, but here it will be convenient to give only the conclusions.

Excepting the two in whom treatment was stopped within the first week all the patients remark on their very increased sense of well-being. 65.7 per cent. of the patients treated gained weight, as against 52.4 per cent. of the patients treated by Mercado's (Heiser's) formula during 1920 and 42.5 similarly treated in 1919. It must be remembered that on the average the patients treated intravenously were much more advanced and retrogressive than those otherwise treated.

During the treatment there were no acute reactions, which, though much decreased by intramuscular treatment, were still fairly common among the other patients.

The effect on the pulse rate and temperature



Half-hourly temperature and pulse chart of patient after injection of chaulmoogra oil intravenously.

chart was to cause a more rapid and more steady approach to the normal.

In individual nodular cases one noticed congestion and subsequent disappearance of nodules and infiltrations (though no nodular case has yet lost all or even most of his nodules), decrease in the size of nodules, growth of hair which had previously dropped, and general improvement in health and vigour. One nodular case, after many years of invalidism, surprised us by entering for events in the swimming sports at Christmas and making quite a good show.

In nerve cases there has been regrowth of hair and much improved nutrition of the skin, together with marked improvement in the general health.

One case of mixed leprosy, a European whose disease had steadily progressed under lengthy treatment with intramuscular chaulmoogra by Heiser's method, has gained 11 lb. in weight in four months with marked regrowth of eyebrows and improvement in the nutrition of his skin. Three cases complicated by frank tuberculosis have particularly improved.

Of the cases under treatment by intravenous in-

jection only one has required operation and that was for caries of a phalanx of toe, the caries antedating the commencement of his treatment. During the whole year 139 operations have been performed under chloroform as well as a large number of operations without chloroform. The daily average

injection was responsible for a decrease in the number of operations and dressings. The only real objection to the intravenous injection of chaulmoogra oil is that when by accident the vein is missed and the injection made into the cellular tissues, a painful swelling persists for two or three

Serial number of case	Sex	Age	Type of disease	Total quantity of chaulmoogra oil injected	Total number of injections	Weight before commencement of injections		Weight at end of year		Remarks
						st.	lb.	st.	lb.	
1	M	40	Advanced nodular	xix 26	106	11	1½	11	3½	
2	M	35	" "	xix ?	106	9	7½	10	3½	
3	M	32	Mixed ... "	xix 32	106	10	7	11	0	
4	M	35	Advanced nodular	xviii 37	105	10	11	11	2½	
5	M	17	" "	xix 12	105	7	5	7	10	
6	M	12	" "	24	6	?		?		Treatment stopped for technical difficulties
7	M	22	" "	xviii 4	94	10	7	10	6½	
8	M	49	Mixed ... "	xiv 21	81	9	10	10	7	
9	M	35	" ... "	xvi 49	93	10	5	10	3½	
10	F	40	Nerve ... "	xvi 56	94	10	1	9	11	
11	F	35	Nodular ... "	xvi 20	79	8	9	9	4	
12	M	18	Advanced nodular	xvi 17	89	8	6	8	13	
13	M	25	Mixed ... "	xvi 20	89	10	8	11	5½	
14	M	42	Nodular ... "	xvi 87	12	9½	12	5		
15	M	50	Nerve ... "	xvi 15	89	11	1½	10	10	
16	M	52	" ... "	xv 45	87	9	2	9	4	
17	M	45	" ... "	xvi 25	89	9	0½	8	12	
18	M	54	Nodular ... "	xvi 15	89	8	8½	8	9	
19	M	40	Nerve ... "	xvi 25	89	10	10	10	9	
20	M	42	Nodular ... "	xv 25	83	12	1	12	9	
21	M	30	" ... "	xv 10	82	12	5	12	1	
22	M	28	Advanced nodular	20	4	?		?		Advanced filariasis; advanced nephritis
23	F	30	Nerve ... "	xiv 75	8	10½	8	13½		
24	M	25	" ... "	xiv 25	71	9	4½	9	5	
25	M	25	Mixed ... "	xiv 25	65	10	9	10	11	
26	M	20	Nodular ... "	xiii 45	59	11	9	11	6	
27	M	18	Mixed ... "	xiii 20	65	8	9	8	9	
28	M	15	Nerve ... "	xii 10	65	9	3	9	7½	
29	F	16	Advanced nodular	xii 20	65	5	9	6	12	
30	M	8	Nerve ... "	vi 52	53	3	8	3	10	
31	F	16	Advanced nodular	x 25	53	7	5	7	6½	
32	M	25	Nerve ... "	x 30	53	11	11	11	11½	
33	M	15	Nodular ... "	x 25	53	10	9	11	5	
34	M	40	Nerve ... "	ix 45	50	12	10½	12	9½	
35	M	14	" ... "	x 25	53	5	7	5	9	
36	M	40	Nodular ... "	viii 25	41	15	0	15	2	
37	F	9	Advanced nodular	viii 2	41	3	3	3	4	
38	M	18	Nerve ... "	vii 10	33	10	1	10	1½	
39	M	45	" ... "	vii 10	33	9	0	9	1½	
40	F	50	Advanced nodular	vi 20	28	10	12	11	1	

number of patients in the asylum has been 303. The operations under chloroform included:—

- 12 Lisfranc's amputation
- 7 Syme's amputation
- 3 Chopart's amputation
- 5 amputations of leg
- 22 operations for nerve release and stretching
- 1 radical cure of filarial hydrocele
- 12 operations for the removal of tuberculous glands
- 1 iridectomy
- 1 enucleation
- 6 operations for ectropion

I think it is fair to say that the intravenous

days in cases with good muscular tone and for somewhat longer in debilitated cases. In the first 3,000 injections there were two cases of mild and transient phlebitis, necessitating the avoidance of the inflamed vein and the injection of a vein a good distance from it.

A table is appended showing the main details of the forty cases treated. In that table the cases are classed as advanced nodular, nodular, mixed and nerve, in order to show some gradation in the severity of the cases.

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MAY 16, 1921.

TOBACCO AND ITS USES.

THE Press in Britain has been occupying its pages to a considerable extent with a lecture given recently by the writer concerning tobacco. The result of the discussion has proved jejune, as it ever has done since tobacco was first introduced into England in 1565 by Sir John Hawkins. Many

opinions and little knowledge acquired would seem to be the result up-to-date of all the talk. The history of the introduction of the habit to Europe is indefinite as well-nigh the beginning of all things are. Popularly, and perhaps correctly, Sir Walter Raleigh is acclaimed as the man who introduced smoking into England. It was Ralph Lane, one of Raleigh's appointed governors in the State of Virginia, when the colony was still under British rule, that was "the first English smoker." Be that as it may, smoking rather speedily caught on in England amidst much ridicule, wholesome chaff and derision. The habit spread to such an extent that King James I (of Great Britain) soon after he came from Edinburgh to London issued his famous "counterblast" in 1604. Much to the King's annoyance this diatribe of his rather drew attention to the evident pleasure derived from smoking by a large number of people, so that others took it up, and the habit increased instead of lessening. Although England is accredited with being the gateway through which smoking gained entrance into Europe, it was Jean Nicot who in 1560 actually brought the leaf to Portugal, and the words Nicotine and Nicotiana arose in honour of this Portuguese traveller.

But what about America? Who first used it there? It is impossible to find out; all that we do know is that travellers in the sixteenth and seventeenth centuries found everywhere in North, Central and South America the leaf was used for smoking, chewing and snuff-taking. Now in the Old World the custom is practically universal. Few tribes of human beings either in their hygienic or religious relations forbid the use of tobacco smoking. The Parsees of India do not smoke, but this is on account of its making a profane use of the sacred element of their tenets, namely, fire, which is ever regarded by them with reverence and dread.

Smoking from a pipe of some sort has been used in different countries in a variety of fashions. The smallest pipes used are found in Japan and China, where the bowl holds a mere pinch of tobacco, and when the pipe is lit two pulls at the mouth-piece reduce the whole to ashes, and the pipe has to be emptied, refilled and lit again, a ritual which is repeated time after time. Travellers in China must have often seen a Chinese lady sitting on a chair attended by a small daintily-dressed young girl standing by the side of a table on which are all the appliances required for smoking. The smoke is frequently drawn through water; not a large hubble-bubble apparatus, but a small compact group of metal pieces, including a tiny tobacco jar, a narrow bowl with a "grating" within $\frac{1}{2}$ in. below the inlet, and on this grating a pinch of tobacco is placed, and when lit by the little girl with a spill, the smoker takes hold of the pipe, has two, or at most three draws, hands the pipe back to the little maiden, who empties the ashes out (a mere speck) and is prepared to repeat the filling, &c. It is often said the best part of smoking a pipe is filling and lighting it. If that be so the Chinese have reduced this proceeding to a fine art, for during an ordinary

smoke by a lady the process may be performed anything between twenty to forty times. The hubble-bubble, on the other hand, is often a contraption of formidable size, occupying the centre of an apartment or portion of a room; the prepared tobacco is placed in a porous piece of porcelain or metal bowl; the stem of the pipe is a coiled flexible tube of, at times, several feet in length, which draws the smoke through water, thus washing the smoke, cooling it and freeing it for the most part of nicotine. After the circle of people are assembled round the pipe, the tube and mouth-piece is handed round and each in turn has a pull at the pipe for a period consonant with good manners and again handed on until the circle of folks have all had a turn.

The earlier bowls of pipes consisted of sometimes a walnut shell into which a hollow reed was inserted as a stem, or the cob of the root of the maize plant, and as time passed pipes of porcelain, of clay, of so-called cherry-wood bowls and stems, with devices of various kinds to catch and absorb the nicotine on its way from the bowl to the smoker's mouth. Cigar smoking came in later, and later still cheroots and cigarettes; the last named became general in quite late years. Chewing tobacco with its incessant spitting is an old custom: the "plug" yielding on its first being placed in the mouth a plentiful "juice," which gives rise to expectoration of huge quantities of filthy fluid; the juice was perhaps seldom swallowed, and as the plug became less and less impregnated with nicotine and "baccy juice" the "quid" fulfilled something of the nature of a chewing gum, being only a material of something to chew, as a man chews a straw or stick as "something for the jaws to do for company's sake."

The dangers of smoking are several, some of them serious and some of them merely functional and evanescent: the intermittent pulse of boys and youths learning to smoke, especially noticeable in pipe smoking; the dangers to the lips due to the hot stem causing chronic irritation and leading to sores with an epitheliomatous nature; the hot smoke persistently impinging against one point on the tongue, a condition averted by the continual movement of a cigar, or better still of a cheroot, with its wide end leading to a diffusion of the smoke over a wider area and thus lessening the chances of the tongue being burned or irritated.

The inhalation of the smoke and even the swallowing of the smoke of the cigarette are calculated to act in a detrimental manner, causing dyspepsia and "shortness of breath," &c. It is said that the poisoning induced by smoking disappears from the system in three days after leaving it. This is more or less true, but there are certain conditions of vision, toxic amblyopia, scotoma, &c., which give rise to anxiety as to ultimate recovery.

As general rules in smoking the following may serve:—

(1) Watch the effect of smoking particular kinds of tobacco which cause irregular or intermittent action of the heart and pulse and avoid them.

(2) He who is accustomed to one kind of tobacco,

be it in pipes, cigars, cheroots or cigarettes, should not change to another suddenly. Better leave off for, say, three days altogether before changing, say, from Manilas or Indian cigars to Havannahs and *vice versa*.

(3) Smoke the same quantity every day.

(4) Do not smoke on an empty stomach. Have food before the morning smoke always, be it only tea and bread.

(5) Do not smoke when overtired.

(6) Do not smoke for, say, an hour before going to bed.

The big question of "Tobacco Heart" cannot be better elucidated than is given by Dr. Mitchell Bruce in his *Lettsomian Lecture* of 1902:—

"TOBACCO HEART."

"We have in tobacco a single distinct influence at work; one that is universally acknowledged to affect the heart and vessels, and the physiological action of which is understood; one, further, that can be removed (perhaps not without some difficulty, for I have had a patient plead for his pipe with tears in his eyes), and certainly that can always be resumed with remarkable readiness—in a word, a most favourable subject of observation by experiment. It is well, too, to begin the study of tobacco heart in the young men, whose circulation is still structurally sound, and thereafter to follow up the subject in middle-aged and old persons. Adopting this line of inquiry, I have found that the uncomplicated effects of tobacco on young healthy hearts, as they present themselves clinically, are: palpitation in every instance; a sense of irregular action, post-sternal oppression and pain in half the cases; and in one out of every eight sufferers either angina or uncomfortable sensations in the left arm. Faintness or actual faints occurred in one-third, and giddiness and a feeling of impending death in a smaller proportion. Turning to the physical signs, the heart proves to be of ordinary size in 50 per cent. of the patients; in a few it is very slightly enlarged; the precordial impulse is often very weak, but occasionally increased in force and frequency, and almost as often irregular as not; the pulse tension, with insignificant exceptions, I have always found low. Very interesting, in the light of what I shall tell you later on, is the fact that of twenty of these patients complaining of the heart not one presented a cardiac murmur beyond a weak mitral systolic bruit, varying with posture or cubitus. This is in accordance with the teachings of pharmacology—that tobacco acts on the terminal branches of the vagus.

"Now we are in a position to study the tobacco heart in a man of 40; and again let us begin with a man who is sound, active, and healthy otherwise. He complains of his heart, and recognizes willingly (for he belongs to our own profession), in the discomfort and anxiety from which he suffers, the penalty of having smoked for years the strongest and blackest tobacco that he could buy. Yet his heart is not enlarged, and the cardiac sounds might be described as ordinary were they not peculiarly

irregular, the frequency changing every moment and a falter occurring at short intervals. There is not a trace of murmur to be found in connection with the valves and orifices. At ages over 40 a clinical study of the tobacco heart is highly instructive from a practical point of view. Whilst palpitation is still the common complaint, pain, including angina, is put forward more prominently, and so are faintness, actual faints, a feeling of impending death, and a sense of cardiac irregularity, each intermission being accompanied with a sudden stab through the præcordia. Some of you will remember Mr. Barrie's quaint account in 'My Lady Nicotine' of what he calls the horrors of his smoking days, when the pain at his heart made him hold his breath—'a sting,' as he describes it—and he believed he was dying. In these subjects the heart is more frequently found to be large and feeble; the same weak systolic murmur is occasionally to be heard; the radial pulse is often irregular, and the vessel wall naturally thick. This, you will notice, is a combination of symptoms and signs sufficient to alarm the casual observer. But when we examine it more deliberately, in the light of our study of the tobacco heart in young subjects, on the one hand, and of our knowledge of the normal or natural condition of the heart and arteries at 60, on the other hand, we are able to reassure ourselves and our patients. We are justified in concluding not only that every cardio-vascular lesion which may be found in tobacco smokers is not to be put to the credit of tobacco, but *vice versa* (and this is of more interest to us in our present inquiry), that every præcordial pain, angina, faintness, or irregular pulse in a man of 60 with a full-sized heart is not to be hastily regarded as evidences of grave disease without further inquiry as to his habits. The cardiac enlargement and large pulse may be nothing more than the result of a life of bodily and mental activity; the præcordial distress may be the result only of tobacco. How very necessary this caution is will be impressed upon your consideration by the two following cases. The first is that of a man of 60, actively engaged in professional pursuits, who first suffered from præcordial pain of an alarming character four and a half years ago, and has had attacks since, particularly during exertion and after meals. One day last autumn, at the end of many hours' hard work, cheered by at least eighteen cigarettes, he was rushing off to dine with a friend when he was suddenly seized with præcordial pain which he described as fearful, radiating down the left arm. He broke into a cold sweat, thought that his last hour had come, and for a short time had impairment of consciousness. Shortly after this event he took the advice of his doctors and gave up tobacco (shall I say for a time?), and from that day to this, now six months, he has had no further trouble with his heart.

"The second case is equally striking. A man of 55, of fairly active disposition and somewhat full habit of body, was suddenly seized with angina pectoris in October, 1899. The pain was of a dull bursting character over the region of the heart, and

it passed into the left shoulder, down to the elbow, and settled particularly in the wrist. At the same time there was pain in the upper maxillary region. The heart slowed down from 75 to 50, and the sufferer felt that he was dying. From that time anginal attacks occurred in rapid succession, five, six, nine or even eleven in a single day; occasionally they came on in the night. This experience continued for nearly two months on end; indeed, it was six months before the angina finally ceased. It was instantly relieved with amyl nitrite; nitro-glycerin was unsuccessful. In the course of giving advice to this patient I fortunately discovered that he had just laid in a stock of 2,000 cigars. The line of treatment was obvious; and the result has been, as I have said, complete recovery.

"I have dwelt on the subject of tobacco heart perhaps longer than was necessary, addressing as I am a meeting of practitioners of experience and not a class of clinical students. I have done so to bring home to us an important consideration which we are all apt to overlook in diagnosis and still more in treatment, namely, that whether in an ordinary senile heart, or in a heart that is the seat of chronic valvular disease, or in arterial degeneration, something more than the pathological changes have in many instances to be regarded—usually some entirely adventitious disturbance which alone calls for treatment, such as indigestion, flatulence, worry, a bronchial catarrh, or it may be free indulgence in tobacco, tea or coffee."

Annotations.

Arsenophenylglycine and its Derivatives in Human and Animal Trypanosomiasis (A. Broden and J. Rodhain, *Annales de la Société Belge de Médecine Tropicale*, No. 1, November, 1920).—Samples of this product, discovered by Ehrlich in 1908, were sent by him to the Leopoldville laboratory (Congo) for experimentation. The results of the experiments then performed by the authors (1909-11) are given in this paper, the delay in their publication being due to the war. The paper deals with the method of administration of the drug and dosage; its immediate effect on the trypanosomes and on the general physique; and its later effects and therapeutic action. Extensive tables are appended.

The authors found that arsenophenylglycine "418" injected into the blood or the muscles frequently provoked renal irritation. Some patients tolerated the drug well, others not well; generally speaking, the drug has not the beneficent action which characterizes the atoxyls and salvarsan. The immediate trypanocide effect of doses of 0.50 gr. and of 1 gr. is less than that procured by the atoxyls; in large doses the duration of the sterilization obtained is more than that given by the atoxyls. In patients in an advanced stage of the disease the drug has no such beneficent action as have the atoxyls and salvarsan, and its curative action is insignificant. In cases in the first period

the drug alone, or combined with others, produced a certain number of cures of long duration, possibly definitive; in other words, there appear to have been cases of *therapia sterilisans magna*.

On animals with trypanosomiasis the effects obtained by the drug were insignificant.

Arsenophenoxyessigsäure or "559" was not found superior to arsenophenylglycine in its therapeutic action, while being much more toxic.

Abstracts and Reprints.

ADVANCED PATHOLOGICAL CONDITIONS OBSERVED IN SOUTH CHINA.¹

By J. OSCAR THOMSON, M.D.

SEVENTY-FIVE per cent. of the patients admitted to the Canton Hospital present advanced pathological conditions. The general condition of the patients is poor. They are weak, emaciated, and anæmic from infection from malarial and intestinal parasites. The local condition is usually advanced; in the cases of tumours and abscesses, large, heavy and deep-seated, with pressure symptoms, frequently extension and metastasis have already occurred. Deformity is present and function diminished or lost. Severe pain usually sends the patient to the hospital. Many of the patients have already been treated by the Chinese old style medicine men, who aggravate the condition by acupuncture, cauterization, adhesions, keloid formation, and hasten malignancy.

CONGENITAL ABNORMALITIES.

Unrelieved phimosis is responsible for retention of urine, resulting in cystitis and the formation of vesical calculus. In male children imperforate anus causes auto-intoxication, and in females, rectovaginal fistulæ are produced.

INFECTIONS.

Blastomycosis is prevalent, situated usually upon the hands and forearms and also upon feet, legs and thighs.

Marked entropium, occasionally ectropium, following trachoma, is extremely common. A patient with symblepharon had his left eyelids closed for fifteen years. The cilia were entirely obliterated and the tarsi firmly united, except at the inner canthus, where there was space enough to admit a probe. Upon separating the eyelids with the scalpel, the eye was found to be perfect.

Abscesses caused by the pyogenic organisms are large, burrow extensively, and frequently cause septicæmia and pyæmia. Cellulitis and angina are often seen when the patient is in extremis, as are

also cases of *caruncula oris*, which, however, have been checked with intravenous instillations of antiseptics.

Ulcers are large and difficult to cure. In a child 6 years of age, with large ulcers of the scalp, one hundred maggots were found burrowing under the borders. Gangrene is occasionally due to bound feet. In the case of a patient who was admitted to the hospital six weeks after having been bitten by a snake, the hand became gangrenous and sloughed off; the radius and ulna were entirely bare except for a ligamentous attachment at the elbow-joint. A woman, both of whose legs had been sloughed off, had preserved them in lime and brought them to the hospital with the request that they be grafted on again. Necrosis of the inferior maxilla, secondary to carious teeth, is common. Occasionally half and even the entire mandible has sometimes already separated. In a case of caries of the right humerus, following an attack of fever six years previously, a portion of the shaft of the humerus had separated and projected obliquely through muscles and skin, in which position it had been for two years. The sequestrum was four inches long and half an inch in diameter. In a child 2 years of age with necrosis of the radius, there were two sequestra almost the entire length of the bone. In a case of perforated gastric ulcer, the abdomen was filled with large quantities of viscid lymph. Cases of intestinal obstruction of from twenty to forty days' duration have been treated. Fistulæ in ano, hæmorrhoids and prolapse of the rectum are prevalent and extensive.

TUBERCULOSIS.

Osteomyelitis is a common condition. The sequestrum has usually separated. The tubercle bacillus most frequently affects the hip, and as a rule the joint is ankylosed, with abscess and sinuses. Psoas abscesses are usually present in disease of the spine. In one case the appendix was adherent to the wall of the abscess. A woman with tuberculous coxitis from childhood, in whom the thigh was ankylosed at an acute angle, and in whom the pelvis was markedly contracted, was brought to the hospital pregnant. A Cæsarean section was performed. Both mother and daughter left the hospital in good condition. Adenitis is most commonly cervical, and the average duration of disease upon administration one year. Previous antiquated treatment is responsible for adhesions, ulceration and cicatrization, so that rational treatment is rendered much more difficult. Peritonitis can only be ailed. Mesenteric glands are usually too large and extensive for operation.

VENEREAL DISEASES.

Venereal diseases are more prevalent among soldiers and well-to-do residents of cities—rather uncommon among the agricultural and labouring classes. The Chinese marry young. Post-gonorrhœal stricture with retention of urine is a condition

¹ Abstracted from *New York Medical Journal*, vol. cxiii, No. 11, April 6, 1921.

frequently treated, sometimes from seven to ten days, with extravasation of urine and gangrenous scrotum. In females, in cases of salpingitis and pelvic peritonitis, the organs are hopelessly matted together. A woman, aged 23 years, had a parovarian cyst and salpingitis which were intimately adherent to the neighbouring organs. Chaneroid and bubo are common in young adult males, with severe cases of sloughing phagedena. Although cases of primary and secondary syphilis are frequently seen, late tertiary lesions with considerable destruction of the tissues require treatment. In one case the penis was entirely gone, and there was a large opening into the bladder. A male had an aneurysm of the suprascapular artery of six years' duration, which was two feet in circumference at the base. Native physicians had applied escharotics.

The average duration of disease as given by the patients upon admission to the hospital for vesical calculus was three and a half years, the longest thirty-one years. Twenty per cent. of the cases were of more than five years' duration; of these 25 per cent. were of more than ten years' duration, and 4 per cent. were of more than twenty years' duration of symptoms. The average weight of stone was $7\frac{1}{2}$ drams. A male, aged 23, with symptoms for seventeen years, had three calculi which completely filled the bladder. Another male patient, with symptoms for over twenty years, had a stone 12 oz. in weight. A male of 21 had a tumour the size of half a peach under his urethra, about the middle of the penis, which had been enlarging for twenty years. Two hundred and ninety-one calculi were removed from the urethra and from a sac communicating with it by a narrow passage. A male, aged 72, had 116 calculi under the prepuce. A boy of 9 passed urine from his navel. The rectum was extensively prolapsed, and there was a calculus in his scrotum tightly enclosed in a sac communicating by a small opening with the urethra. A boy of 16 had an opening above the pubes through which his urine discharged. The entire skin of the penis was nonadherent, except at the base and at two other spots.

PROTOZOAN INFECTIONS.

Liver abscesses due to the amoeba and secondary to dysentery are usually large. Seventeen pounds of pus were removed from the liver of a boy of 15. The average duration of disease in patients admitted to the hospital with elephantiasis due to the *Filaria sanguinis hominis* was five years. The condition usually affects the penis and scrotum and leg, less frequently the leg and vulva, and other regions. Twenty-one pounds of elephantoid material was excised from the scrotum of a male patient who had had this condition for six years. A male, aged 44, with elephantiasis for seventeen years, presented, besides a considerably enlarged scrotum, legs $2\frac{1}{2}$ ft. in girth, with tumours $3\frac{1}{2}$ ft. in circumference. A female who had lost most of her nose from syphilis, had elephantiasis of the labia of seven years' duration. The tissue removed

weighed 16 lb. Malaria is responsible for splenomegaly, which usually fills the abdomen, with extensive adhesions. In 30 per cent. of the routine fecal examinations of patients during the last five years, the ova of trematode, cestode or nematode worms were found. In wounds of the intestines, worms are often found in the peritoneal cavity. In 98 per cent. of the cases of vesical calculus, ova of intestinal parasites were isolated. In one case a worm formed the nucleus of the stone. Frequently several different varieties of parasite are found inhabiting the same patient; as many as four varieties have been isolated from one patient. Over 200 worms have been recovered from one patient. Autopsy revealed, in one case, subacute general peritonitis, left-sided pleural empyema, congested lungs, enlarged spleen with increase of trabeculae, fibrosis of the liver. The bile passages were filled with *Clonorchis sinensis*, about a hundred being removed from the cut surface.

TUMOURS.

Tumours of all varieties and of all regions of the body are observed. They are massive and weighty, and cause discomfort and pain, as well as deformity and interference with function, and usually show indications of having been treated with the cautery or caustic plasters. Seventy per cent. are benign and 30 per cent. are malignant. Exploratory laparotomies very frequently show internal tumours to be inoperable. Pterygium is a very common condition. Usually large sarcomas of the orbit are seen. A sarcoma covering the whole side of the patient's face had commenced fifteen months previous as a small papule situated on the left upper eyelid. A girl of 14 had an angioma of the upper lip the size of an orange. A male of 56 presented a tumour of the carotid body of twenty years' duration. Carcinomata of the lip are frequently double (contact), and of the tongue generally inoperable. A large sarcoma of the posterior pharynx was successfully removed after a preliminary tracheotomy. Parotid tumours are large and fixed. In one case it was $2\frac{1}{2}$ ft. in circumference and extended from the orbit to the shoulder. A tumour weighing 9 lb. was removed from a male of 34, who had carried it for ten years. A male patient, aged 46, had a lipoma about $3\frac{1}{2}$ ft. in circumference with attachment at the scapula and extending below the nates. A lipoma over 21 lb. in weight, of twenty years' duration, was removed from a male aged 58. Lymphosarcoma, usually cervical, at first unilateral, is a common condition, the average duration of disease upon admission to hospital being a year and a half. Many become operable after ligation of the supplying arteries. A male, aged 41, had a firm tumour, as large as his head, hanging pendulous from his neck, of seventeen years' duration. The tumour was diseased centrally, having been perforated by escharotics, with an aperture $\frac{1}{2}$ in. in diameter and as regular as if it had been made with a drill. The patient kept it closed with a stopper, every morning evacuating some ounces of

pus. The tumour was 2 ft. in circumference and weighed 7 lb. Tumours of the thyroid are often intrathoracic when they come for treatment. In one case of twenty years' duration, pieces of cartilage and bone were found in the tumour. The patient was 31 years old. A male, aged 35, with osteosarcoma of two years' duration, presented a knee over 32 in. in circumference. The normal member measured 12 in. The average duration of disease in cases of carcinoma of the penis was one and a half years. Inguinal adenitis is usually present. In a boy of 14 with large bleeding sarcoma of the testes, the lower abdomen was filled with glands. A sarcocele of twenty months' duration, weighing 5 lb., was found to consist of numerous cartilaginous sacs in which large quantities of bone were deposited, presenting a coral-like formation. Hypertrophied prostates are not common. They are associated with multiple small calculi.

The usual duration of adenomata of the breast upon admission was three years; of carcinoma, two and a half years. There is usually axillary adenitis. Occasionally, due to local treatment, the superficial tissues have ulcerated. A tumour of the right breast of six years' duration was 2 ft. in circumference, and extended nearly to the hip. A woman, 50 years of age, was relieved of a tumour of the breast of 11 lb. weight, which had been growing for ten years.

The average duration of ovarian tumours upon admission to the hospital is three years. They are very frequently adherent to the adjacent organs and to the parietal peritoneum. A girl of 16 had a dermoid tumour of six years' growth, which was filled with hair, sebaceous material, muscle fibres, skin and bone. A cyst adenoma, which weighed 116½ lb., was removed from a patient, who subsequently weighed 79 lb. A fibroid of eight years' growth, weighing 20 lb., was resected. Papillomata of the ovary and tube with extension of the growth covering the surrounding organs have been seen. An ulcerated fibroid polyp was completely extra vaginal, having caused prolapse of the uterus. The mucous membrane of a uterus which had been prolapsed for ten years resembled tough skin.

TRAUMA.

Wounds are frequently septic when admitted to hospital. Native quacks fill them with tobacco and similar substances, in order to arrest hæmorrhage, or with ointments, or cover them with plasters. Burns and scalds are treated in a similar manner. Marked deformities from the contraction of cicatrices and neglected conditions and occasionally bony union of the jaws following injury require treatment. Incarcerated and strangulated hernia are frequently seen. One case presented an unusually large patent Meckel's diverticulum. Hernia is sometimes associated with urethral stricture or vesical calculus. Foreign bodies removed are commonly bullets, fragments of bombs, pieces of bamboo or needles. A piece of iron, 1½ in. long and ¾ in. wide, was removed from the left nostril

of a patient, where eight years ago it had been embedded when his gun exploded.

A young man was shot in the neck by pirates. The bullet, weighing 2 drams, entered the right side of his neck, passing between the œsophagus and vertebrae and wounding both. Several months later fragments of two vertebrae with the intra-vertebral cartilage were discharged by the youth's mouth. Large lead slugs are used by the pirates and robbers. The wounds are therefore severe and fractures usually comminuted with considerable loss of substance. In abdominal wounds, peritonitis is often present, the abdomen is full of blood, or intestinal parasites may be seen wandering from their normal habitat in the intestine. Gored wounds of the abdomen are sometimes seen in boys.

SUICIDE.

Suicide among the Chinese is fairly frequent. Feuds and jealousies in families and distress among the working classes are the chief causes. Women sometimes resort to hanging and men more frequently to opium. A female patient completely severed both trachea and œsophagus. One patient cut off the end of his tongue. One committed harikari, performing abdominal section in eight places. A dozen cut their throats, one completely severed both trachea and œsophagus. A woman inserted thirteen needles in a piece of orange rind and swallowed it. A male drove a 5 in. nail through his abdomen to the spine with a brick. A young woman fell from a ladder and a bamboo pole, 1 in. in diameter, sawed off square, entered the right axilla, passed upwards, fractured the clavicle, came out and re-entered the side of the neck, perforated the trachea and œsophagus, and was arrested by the hard palate of the opposite side. Fluids and air passed out at the side of the neck. She recovered.

TRAUMATIC INJURIES.

A man, aged 31, was robbed of his money, and then both his feet were cut off by the robbers in order to give them time to escape before he could report them.

One of the cases seen was a man of 40, who applied to a Chinese doctor to relieve him of stricture, who introduced a copper fork, over 3 in. long, handle first, into the urethra, when it slipped through his fingers and passed entirely within, where it had remained for two weeks. A bullet was extracted from the forehead of a soldier which had entered its full length, but had been arrested by the inner table, where it had remained for two months. A boy, 2 years of age, fell from a chair, striking an earthen washbasin and breaking it, a fragment of which produced a punctured wound of the abdomen through which 18 in. of small intestine had escape and become strangulated.

In another case a patient, holding in his hands a glass vessel containing over a pound of gunpowder, a spark dropped from a lighted cigarette he was smoking. This caused an explosion which blew off

his hand and deeply embedded pieces of glass in many parts of his body. With the Röntgen rays a sharp angular piece of glass nearly 1 in. in length lying close to and rather beneath the femoral artery was found and removed. A man fell from a roof, a splinter of wood entering 5 in. through the sphincter and prostate. For three years it was *in situ*, protruding for more than an inch. He voided urine from a fistula above the pubes and was reduced to a skeleton.

Another case was a girl, aged 16, who had an aneurysm of the temporal artery, high up on the head, caused by a blow inflicted by a playmate with a pillow made of bamboo. A male patient fell from the roof of a house fracturing his right humerus, which did not unite. When admitted to the hospital the elbow, which contained aneurysm, measured 31 in. in circumference. The limb when amputated at the shoulder weighed 23 lb.

Fractures and dislocations are often seen at a late stage, ununited or malunited, with neighbouring joints ankylosed. Dislocations frequently are irreducible, and require resection of the head of the bone or arthroplasty. Stricture of the rectum is sometimes due to treatment by quacks of hemorrhoids with caustics. A woman whose finger was much swollen and ulcerated had four rings embedded in the mass. Two rings were broken and removed. Two other brass rings were hanging to the flesh as if they had worked their way through the bone during a period of five months.

Pregnancy and labour account for many cases of advanced pathology which require attention. The perineum is often completely ruptured, with resulting partial incontinence. In cases of vesicovaginal fistula associated, the vagina may be walled off by scar tissue. A ruptured uterus is sometimes seen in cases of transverse presentation. Occasionally the head is pulled away from the body by midwives, or the body from the head in cases of breech presentation.

Dog and pig bites may be the cause of fistula of the penile urethra in male children.

COMPLICATIONS.

A large number of cases admitted to the Canton Hospital are not content with one pathological condition. From chronicity or neglect, or due to their poor condition, they present complications or co-existing disease, as is illustrated by the following cases:—

A male, aged 19, with ten years' duration of symptoms and a 6-oz. vesical calculus, had scoliosis, attributed to the position he occupied in order to get relief from pain. A male, aged 65, had post-gonorrhoeal stricture with false passages, hypertrophied prostate, cystitis, eight vesical calculi, double hernia and hemorrhoids. A woman with complete retention of urine, with a vesical calculus, had had constipation for ten days and prolapsus uteri since the birth of twins. A woman with retroverted gravid uterus and retention of urine for twenty-five days required to be catheterized for a month after the removal of 19 lb. of urine.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.
No 1. January, 1921.

Small-pox Vaccine and Vaccinia in French West Africa (Dr. Bouffard).—The writer emphasizes the necessity for preserving the lymph from light as well as heat, and suggests that in the tropics it should be triturated in the early morning and put up in yellow glass tubes. For transporting seed lymph from France to the colonies he has found a thermos flask very satisfactory. His experience has shown that whereas lymph collected from the calf on the fourth day is generally effective if used immediately, it is better not to take it until the sixth day, except in cases of emergency.

On a Septic Aerobic Bacillus (Dr. Boucher).—The bacillus was noticed in four cases of meningitis at Tananarivo. In one instance it appeared to be the causal agent, in the others a secondary infection. When injected into animals it produced extensive gangrene of the type seen in connection with infected wounds during the war; it developed more rapidly if aided by lactic acid or the presence of another organism, and though nearly always recovered after death, was never found in pure culture. As an aerobe, it could not be confused with the gangrene-causing anaerobes, such as *perfringens*, *Vibrio septique*, &c. In its method of reproduction and cultural characteristics in milk it resembled *mesentericus vulgaris*, but differed from that bacillus in that it showed involution forms and liquefied gelatine less quickly. In its disagreeable odour and process of development on gelatine it was comparable with Roger's *septicus putidus*. It was not the septic aerobe isolated by Legros from several cases of human gangrene. On the whole, the author is of opinion that the bacillus is a new species, and proposes to name it *Bacillus septicus meningitidis*.

The Stephanurosis of Pigs and its Agent (Prof. K. J. Skrzabin).—While examining the heminthological collection at the Petrograd Academy of Science, the author discovered three male specimens of *Stephanurus dentatus* Dies of uncertain origin. They were 25-26 mm. long by 11 mm. maximum width, with a circular mouth 204 microns in diameter, surrounded by from thirty to thirty-four chitinous teeth. The chitinous ring from which the latter projected was joined to a flange divided into six festoons, two double and four single. In each of the deep sinuses separating the festoons was a slightly curved, sharp papilla, with a larger, straight papilla placed farther back than the others in the central indent of each double festoon. The buccal capsule was cup-shaped, with thick walls, measuring 200 microns in length and width. At the bottom of this capsule, near the entrance to the oesophagus, were very small, blunt, umbilicate teeth. The oesophagus was 1.1 mm. long, narrow near the nerve ring, wider (370

microns) in the posterior part. The nerve ring was situated 340 microns from the anterior end of the body, and the excretory pore a little behind it. There were two spicules of equal length, 935 microns, slightly curved inwards. The caudal bursa was well-shaped, with less prominent lobes than in most of the Strongylidæ. A feature distinguishing *Stephanurus dentatus* from the other nematodes, and present, of course, in the specimens, is its characteristic intestinal tube, which, instead of being practically straight, is much longer than the body of the worm, and forms a series of loops folded over either backwards or forwards.

Histo-pathological Study of a Case of Primary Malaria (M. E. Pringault).—On admission to hospital on the third day of illness the patient presented a clinical picture of pernicious malaria with typhoid conditions, and died within twenty-four hours. No history could be obtained, except that he had had no previous attack of fever. In the spleen and all the organs examined at autopsy there was extreme pigmentary infiltration with equally intense macrophage reaction. The liver showed commencing cirrhosis; hypertrophy of the hepatic cells and pigmentation with fatty degeneration here and there. Congestion of the lungs with desquamatory alveolitis and œdema. Acute gastritis and enteritis characterized by abrasion of the mucosa and leucocytic infiltration of the serous membrane. Immense quantities of pigment in the mesenteric lymph glands obscuring the structures of the capsule and parenchyma. Marked mononucleosis with decrease of lymphocytes and polynuclears. Melanine granulations more numerous in the polynuclears than in the mononuclears. Many parasites in the red cells. Slight thickening of the cortical connective tissue of the suprarenals and throughout the connective tissue of the medulla, with discrete patches of hæmorrhage and slight congestion in the latter. Marked epithelial nephritis.

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Vol. lvi, No. 3, March, 1921.

The Uses of Sodium Cacodylate (S. Mallannah, M.D., D.P.H.).—This drug has been tried in many diseases, such as diabetes, Graves's disease, leprosy, cancer, neurasthenia and many others, but though helpful in mild cases, in severe ones it is of no use at all. It is not a specific for any disease either caused by protozoa or bacteria. It has been found, however, to be very useful when used as an auxiliary medicine in connection with other remedies, especially in phthisis, and the best results are seen when it is combined with tuberculin or sodium morrhuate. The drug can be given safely subcutaneously in 3-gr. doses every three or four days. Its administration produces an improvement in appetite, a reduction of temperature, increase of weight, and a feeling of well-being.

Auto-Hæmic or Auto-Serum Therapy (D. N. Sen, I.M.S.).—The subject of auto-hæmic therapy, or

treating a patient with his own blood, though not a new idea, has still some novelty in the fact that it is now being studied in the light of fuller knowledge than before. The rediscovery of the healing power of the blood is entirely the result of laboratory work. The treatment is based on scientific principles and is similar to auto-vaccine therapy; it consists of drawing a few drops of blood from a vein of the patient and adding them to some sterilized distilled water. This is then subjected to certain laboratory processes, dilution, lysis, and thermolysis, and ten or twenty drops of the solution containing the products of these processes are injected into a vein, or under the skin of the patient. The injections may be given either subcutaneously or intravenously, the latter method being more prompt and efficacious.

Correspondence.

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April, 1921.

To the Editor of THE JOURNAL OF TROPICAL MEDICINE AND HYGIENE.

Re THE CERCARIA OF SCHISTOSOMUM SPINDALIS.

SIR,—My attention has been drawn to a footnote in an article entitled "Suggestions for further research in Schistosomiasis," by Professor Frank Milton, in the JOURNAL OF TROPICAL MEDICINE AND HYGIENE of February 1, 1921, p. 30, in which he refers to a new confusion introduced by Bahr and Fairly who, reporting on the cercaria of *S. spindalis* sent to them by Colonel Liston, state that the cercaria has a well-marked pharynx; and Milton recalls Montgomery's statement that *S. spindalis* is apharyngeal.

The morphology of this cercaria, which has been shown to be the larval form of *S. spindalis* (vide Liston and Soparker, *Indian Journal of Medical Research*, vol. v, 1918, pp. 567-568) which, by the way, was found in Bombay and not in Calcutta as stated by Milton, has been studied, a description of which will shortly be published in the *Indian Journal of Medical Research*. My observations based upon examination of living specimens have shown that it does not possess any muscular pharynx. Absence of muscular pharynx is, according to Leiper, one of the main diagnostic features of Schistosome cercariæ and the larva of *S. spindalis* is no exception to the rule. The statement of Bahr and Fairly appears to have been based upon examination of preserved material and the apparent confusion caused by their statement referred to by Milton disappears in the light of observation made upon living material.

I am, yours, &c.,

M. B. SOPARKAR, M.D.

Original Communications.

NOTES ON CERTAIN FORMS OF BRONCHITIS CLINICALLY RESEMBLING TUBERCULOSIS: BRONCHOHEMISPOROSIS, BRONCHOMONILIASIS, BRONCHOANAEROMYCOSIS.

By ALDO CASTELLANI, C.M.G., M.D., M.R.C.P.

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AND

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For some years in a series of publications one of us has called attention to the comparative frequency of various types of bronchitis and bronchoalveolitis closely resembling tuberculosis. These affections are mostly found in the tropics, but some of them, in our experience, are not at all uncommon in temperate zones. They may be classified as follows:—

- | | |
|------------------------------|--|
| (A) Due to animal parasites | (1) Protozoa—Bronchospiræchetosis.
(2) Metazoa—Bronchial paragonimiasis. |
| (B) Due to vegetal parasites | (1) Phycomycetes—Bronchomucormycosis.
Bronchooidiosis. |
| | (2) Ascomycetes {
Bronchoendomycosis.
Bronchoaspergilliosis.
Bronchopenicilliosis. |
| | (3) Fungi imperfecti {
Bronchocryptococcosis.
Bronchomoniliasis.
Bronchohemisporosis.
Bronchosporotrichosis.
Bronchonocardiasis (Bronchoactinomycosis; Broncho-streptothricosis; Bronchodiscomycetosis. (Bronchoconistreptothricosis.)
Bronchoanaeromycosis. |

In the present notes we propose to offer a few remarks on three forms of group B, to which so far not much attention has been paid:—

- (1) Bronchohemisporosis.
- (2) Bronchomoniliasis.
- (3) Bronchoanaeromycosis.

BRONCHOHEMISPOROSIS.

This condition, first described in 1910 by one of us in Ceylon, is due to fungi of the genus *Hemispora* Vuillemin, which are characterized by the conidiophores terminating into an ampulliform structure (protoconidium) which later divides into several sporiform bodies (deuteroconidia). The species we have so far isolated in this country are two, one identical with *H. rugosa*, previously found in the tropics, and the other probably a new species or at least variety. The principal character of these two fungi are briefly the following:

Hemispora rugosa Cast. 1910 (Syn. *Monilia*

rugosa Castellani 1910) is a hyphomycete with the botanical characters of the genus *Hemispora*; it is Gram-positive but not acid fast, the growth on glucose agar is abundant with a crinkled surface, occasionally cerebriform, of amber-yellow or brownish colour. No gas is produced in any sugar, but a little acidity may be present in glucose, levulose, saccharose, and maltose. The fungus usually has no action on milk, but occasionally it induces a slight degree of peptonization with a small coagulum at the bottom of the tube. Gelatine is slowly liquefied. This fungus was first found by Castellani in cases of bronchitis and tonsillitis in Ceylon, and later by Pijper in certain cases of thrush. Castellani placed at first the fungus, temporarily, in the genus *Monilia*, later removing it at the suggestion of Professor Pinoy to the genus *Hemispora*.

Hemispora pararugosa Castellani, Douglas and Thompson 1921, morphologically and culturally very similar to *H. rugosa*. Gram-positive, not acid fast. Does not produce gas or acid in the usual sugars and carbohydrates, but at times produces acidity in starch. Does not liquefy gelatine and there is no production of acid or clot in milk.

Symptomatology.—A mild and severe type of the affection may be distinguished. In the mild type the general condition of the patient is good, there is no fever, and he simply complains of cough. The expectoration is mucopurulent and does not contain blood. The physical examination of the chest is negative, or only reveals a few coarse râles.

The severe type closely resembles phthisis; the patient becomes emaciated, there is hectic fever, and the expectorations may be bloody. The physical examination may reveal patches of dullness, fine crepitation and pleural rubbing. It is interesting to note that the affection occasionally develops after a tonsillitis caused by the same fungus, and characterized by the presence of yellowish or greyish patches.

BRONCHOMONILIASIS.

Attention was first called to this bronchial affection by one of us in 1905, and valuable work on the subject has been carried out recently by a number of authors; the condition, however, is still little known, though it has been found in many tropical and subtropical countries, and also in temperate zones. Pinoy has described cases in France, Pijper in South Africa, and Chalmers and MacDonald and Fahra have observed a number of cases in the Soudan and Egypt, while Iacono has found several cases in the South of Italy, and cases have recently been found in this country by us. The condition appears to be caused by several species of the genus *Monilia* Persoon, usually *M. tropicalis* Cast., *M. pinoyi* Cast., *M. krusei* Cast., and *M. metalondincensis* Cast.

As regards the botanical characters of the genus *Monilia*, the original definition by Persoon is "Stipitata aut effusa byssoidea, Fila moniliformis articulata." These fungi are stated to be characterized by the sporophores, being simple or sub-

dition of the patient is good and there is no fever. The expectoration is muco-purulent, often scanty, and does not contain blood. The physical examination of the chest is negative, or reveals only a few râles. The condition may last for several weeks or months, or may get cured spontaneously, or continuing, may turn into the severer type.

The severe type closely resembles phthisis. The patient becomes emaciated, there is hectic fever, and the expectoration is often bloody. The physical examination of the chest may show patches of dullness, fine crepitations, pleural rubbing. This type may end fatally.

The treatment consists in giving potassium iodide to which glycerophosphates and balsamics may be associated. It is interesting to note, however, that in certain cases potassium iodide has practically no beneficial action whatever. Vaccines are occasionally useful.

Diagnosis.—The diagnosis is based on the absence of the tubercle bacillus and the presence of monilias in the sputum. It is essential that the sputum should be collected in sterile receptacles after the patient has gargled thoroughly with warm sterile water. In certain cases the microscopical examination of the sputum shows spore-like, roundish or oval cells often presenting a double contour and occasionally some portions of mycelial threads. In other cases, the microscopical examination is completely negative and the fungus can only be found by cultural methods; at any rate, it is impossible to make a definite diagnosis of bronchomoniliasis without a cultural investigation which should be carried out as follows: A small amount of sputum is smeared on several tubes of glucose or maltose agar, which should be kept at a temperature of 22° to 25° C. for two or three days, when white, rather large, roundish colonies will appear, easily differentiated with a little practice from the colonies of cocci and other bacteria. To determine the species of monilias present, the strain isolated should be further investigated by inoculating milk, gelatine, serum and the following carbohydrates: glucose, levulose, maltose, galactose, saccharose, inulin and dextrin.

PRIMARY AND SECONDARY BRONCHOMONILIASIS.

Primary bronchomoniliasis should be distinguished from secondary bronchomoniliasis which fairly frequently develops in cases of tuberculosis and other chronic conditions, as shown by Castellani and Chalmers, Macfie and Ingram, and other observers. A diagnosis of primary bronchomoniliasis should be arrived at, using great caution as, firstly, monilia fungi are frequently very abundant in the air in tropical countries, and very quickly contaminate samples of sputa that by any chance have been exposed to the air, even for a few seconds; secondly, these fungi, especially in the tropics, are not rare in the mouth, in the saliva, and therefore a patient should be made to gargle and rinse his mouth with sterile salt solution before he is asked to cough and expectorate; thirdly, even if the fungus

be present in the mucus originating from the bronchi, there are apparently certain cases in which the fungus is not pathogenic, being merely a saprophytic organism. A definite diagnosis of primary bronchomoniliasis, therefore, should be arrived at only with great caution, when the bronchial expectoration collected with every possible precaution contain a monilia in fair amount, tubercle bacilli being absent, and when the amount of the fungus present decreases rapidly with the gradual improvement of the condition. Pathogenic monilias mostly belong to the *M. tropicalis* group, the *M. krusei* group, the *M. pinoyi* group, the *M. metalondinensis* group.

BRONCHOANAEROMYCOSIS.

We have given, temporarily, the generic name *Anaeromyces* to a group of bacillary fungi of the order *Microsiphonales* Vuillemin 1912, which are found in certain cases of bronchitis, and which show transition and intermediate characters between the genus *Mycobacterium* Lehmann and Neumann 1896, the genus *Corynebacterium* Lehmann and Neumann 1896, of the family *Mycobacteriaceæ* Mähe 1899, and the genus *Nocardia* Toni and Trevisan 1889 (*Cohnistreptothrix* Pinoy 1911, *pro parte*) of the family *Nocardiaceæ* Castellani and Chalmers 1918 (*Actinomyces* Lachner-Sandonal, *Trichomyces* Petrusky).

The organisms of the group *Anaeromyces* are very closely related to the genus *Corynebacterium* Lehmann and Neumann (diphtheria and diphtheroid bacilli) and the genus *Nocardia* Toni and Trevisan (*Actinomyces* Harz, *Discomyces* Rivolta, *Streptothrix* Rossi-Doria, *Oospora* Sauvageau and Radais, *Cohnistreptothrix* Pinoy *pro parte*), but in contrast to the former branching is much more marked, and they are strictly anaerobic, and in contrast to the latter the mycelium is very much less developed, the growth is moist and not dry and crinkled, and they never give rise to actinomic granules in the lesions. They are Gram-positive, non-motile, and not acid fast. These germs, or similar ones, were found in cases of bronchitis in 1904 by Chalmers and one of us, and were referred to in a short paper read at the time as "bronchial anaerobic diphtheroid bacilli," but the observation attracted very little notice. They are also somewhat similar to *Bacillus vitulorum* Flüge.

In the present paper we shall limit ourselves to describing briefly a strain which we have named *Anaeromyces bronchitica*, and which appears to be fairly common in cases of hæmorrhagic bronchitis.

Anaeromyces bronchitica Castellani, Douglas and Thomson.—**Morphological and Staining Characteristics.**—The organism is bacillus-like and resembles in its shape a diphtheroid bacillus, but branching is much more marked. It is Gram-positive and not acid fast. It measures 3 to 5 microns in length and 0.3 micron in breadth.

Motility.—The organism is non-motile.

Relation to Oxygen.—The organism is an obligate anaerobe.

Cultural Characters.—Provided a strictly anaer-

obic technique be used, the germ grows well in many of the usual laboratory media. The growth on glucose agar and other media is not very characteristic. The fungus does not seem to grow in gelatine at 22° C.

Biochemical Reaction.—There is no formation of acidity or gas in any carbohydrate we have experimented with, viz., glucose, levulose, maltose, galactose, saccharose, lactose and inulin. Milk is not clotted.

Animal Experiments.—The action of this organism in the lower animals has not yet been fully investigated, but it does not seem to be pathogenic to guinea-pigs. The results of further experiments which are now in progress will be published at a later date.

Pathological Conditions in Man in which Anaeromyces bronchitica has been found.

Anaeromyces bronchitica has been isolated from a fairly large number of cases of bronchitis which may be classified into two groups:—

(1) The hæmorrhagic type.

(2) The muco-purulent type.

Cases of the hæmorrhagic type closely resemble pulmonary tuberculosis; there may be intermittent or remittent fever; the patient may become anæmic and lose flesh; the expectoration contains blood and is at times of a very characteristic bright brick-red colour. The physical examination of the chest may be at times almost completely negative, at other times it may show signs pointing to tuberculosis, such as patches of dullness and crepitations.

The symptoms noted in the muco-purulent type do not differ from those of an ordinary case of subacute or chronic bronchitis. The sputum is muco-purulent or at times frankly purulent; there may be slight fever, but the general condition of the patient is not affected for a long time. In some cases the muco-purulent type after a variable period of time turns into the hæmorrhagic form.

Geographical Distribution.—The organism has been found in cases which contracted the disease in Ceylon, in the Federated Malay States, Serbia, Italy, France and England.

Mixed Infections.—We have grown anaeromyces occasionally from bronchial cases in which monilia and other fungi, and also the tubercle bacillus, were present.

Pathogenicity of Anaeromyces.—Is anaeromyces really pathogenic to man, and is it the specific cause of the hæmorrhagic bronchitis we have mentioned? The few animal experiments carried out so far do not seem to show that the germ causes any very serious lesions in guinea-pigs, and this is, of course, a point against the organism being pathogenic. On the other hand, the following facts are in favour of its pathogenicity to man: (1) The anaeromyces present in the sputum rapidly decreases in amount and finally disappears with the gradual improvement of the bronchial condition, and (2), in a number of cases the hæmorrhagic expectoration very rapidly ceases and all the other symptoms quickly disappear by using an anaero-

myces vaccine without any other treatment. We are, therefore, inclined to believe that anaeromyces has at least some part in the ætiology of certain cases of hæmorrhagic bronchitis.

RESUME AND CONCLUSIONS.

(1) There are a number of bronchial and broncho-alveolar affections simulating tuberculosis which, however, are not due to the tubercle bacillus, but to very different organisms of both vegetal and animal origin. In the present paper we have called attention to three of these conditions, viz., Broncho-hemisorporosis, Bronchomoniliasis, and Broncho-anaeromyces.

(2) The fungi we have found in cases of broncho-hemisorporosis in this country have been *Hemispora rugosa* Castellani, 1910, and *H. pararugosa* Castellani, Douglas and Thomson, 1921.

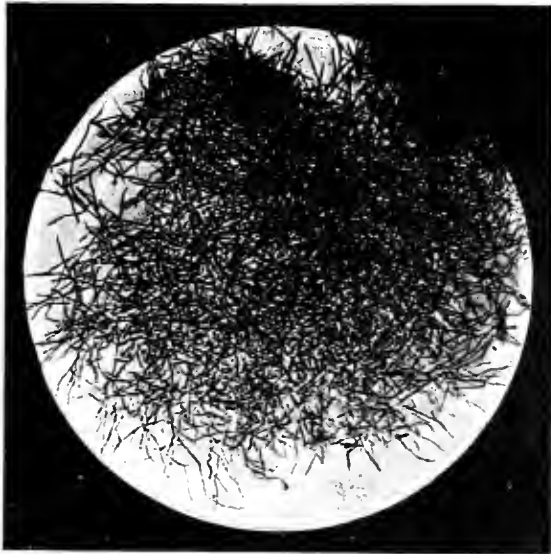
(3) The fungi most frequently found in bronchomoniliasis are those of the type *Monilia tropicalis* Castellani, *M. pinoyi* Cast., *M. metatondincensis* Cast., and *M. krusci* Cast. Primary bronchomoniliasis should be distinguished from secondary bronchomoniliasis, which is a much more common condition.

(4) We have used the term bronchoanaeromyces to denote a broncho-alveolar condition, often simulating tuberculosis, in which a *strictly anaerobic bacillary fungus*, showing transition characters between a bacterium of the genus *Mycobacterium* Lehmann and Neumann (*B. diphtherie*, diphtheroid bacilli) and fungi of the genus *Nocardia* Toni and Trevisan (*Actinomyces* Harz, *Discomyces* Rivolta, *Streptothrix* Rossi Doria, *Oospora* Sauvageau and Radais, *Cohnistreptothrix* Pinoy *pro parte*) has been found: *Anaeromyces bronchitica* Castellani, Douglas and Thomson. This obligate anaerobic bacillary fungus morphologically resembles a diphtheroid bacillus, but in special media presents more distinct branching. It is non-motile, Gram-positive, not acid fast, and does not produce actinomitic granules in the affected tissues. Whether this fungus is the specific causative organism cannot yet be stated with certainty, but it apparently plays a certain rôle in the ætiology of the condition as the administration of anaeromyces vaccine often causes the disappearance of all the symptoms, and has a specially rapid beneficial action in hæmorrhagic cases.

We wish to express our thanks to Mr David de Silva for much assistance rendered in the investigation of the three types of bronchomycosis which form the subject of this paper.

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Hemispora pararugosa glucose broth. $\times 125$.



Hemispora pararugosa: glucose broth. $\times 500$.



Anaeromyces bronchitica: glucose agar. $\times 1,000$.



Anaeromyces bronchitica: 10 per cent. glycerine peptone water.
 $\times 1,000$.

To illustrate paper on "Notes on Certain Forms of Bronchitis clinically resembling Tuberculosis: Bronchohemisporosis, Bronchomoniliasis, Bronchoanaeromycosis," by ALDO CASTELLANI, C.M.G., M.D., M.R.C.P., MACKENZIE DOUGLAS, M.D., and T. THOMSON.



Hemispora rugosa.



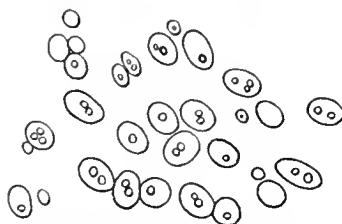
Hemispora pararugosa.



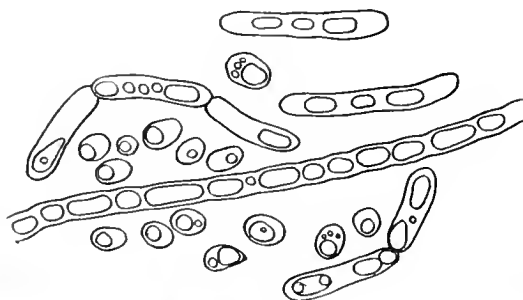
Anaeromyces bronchitica: glucose-agar culture.



Hemispora rugosa:
glucose-agar culture.



Monilia tropicalis: preparation from
a glucose-agar culture.



Monilia tropicalis.



Monilia tropicalis:
glucose-agar culture.

SOME ASPECTS OF DIFFERENTIAL DIAGNOSIS IN TROPICAL FEVERS.

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"FEVER" is such a commonplace of tropical practice that it does not always receive the attention it deserves.

"Malaria" is considered a safe diagnosis for any fever which is not acute and the origin of which is uncertain. An accurate diagnosis, however, is of the greatest importance, both to the individual, in order that he may receive appropriate treatment, and to the Public Health Authorities, in order that an accurate knowledge of the incidence of the various diseases may be available and that appropriate measures may be taken for their prevention.

The fevers most commonly met with in the West Indies are due to the following causes: Malaria, filaria, typhoid, paratyphoid, worms, pulmonary tuberculosis, influenza. In addition we get fevers which may be said to be due to "uncommon" causes, such as pneumonia, meningitis, anterior poliomyelitis, septicæmia, liver abscess, &c.

If we consider the "common" causes in a class by themselves, we will find that the fevers most likely to be confused are malaria, filaria, paratyphoid and pulmonary tuberculosis. It will help us greatly, therefore, if we compare first the points in which these fevers agree, then the points of divergence between them.

Malaria at one time was supposed to present certain classic symptoms which made its diagnosis a comparatively simple affair. These symptoms were: (a) A definite periodicity; (b) a cold stage (agues) and a hot stage; (c) it yields to quinine treatment. Later still, when examination of the blood became more general, we had an additional aid to diagnosis, which—apparently—made it impossible for us to err. In practice, however, our carefully built theories fall to the ground. We find an unexpectedly large proportion of cases of malaria in which an accurate diagnosis is extremely difficult.

If we examine the blood in each case and record the findings under the usual heads: (i) Finding of parasites, (ii) pigmented mononuclears, (iii) mononucleosis, we find many cases of undoubted malaria in which examinations of thick and thin films fail to reveal any parasites.

There is a large proportion of cases in which patients have been dosing themselves with quinine for days before the doctor is called. This is the usual practice in the tropics. We have to recognize that three-quarters of the cases of fever which we are called upon to diagnose come in this category, in which the absence of parasites in the peripheral blood does not signify that the fever is not malaria.

Secondly, there is a certain proportion of cases of subtertian malaria in which the parasite is very rarely found in the peripheral blood.

Thirdly, there is a proportion of cases in which the parasite, for no reason that I can discover, is absent from the blood for weeks at a time, in spite of malarial pyrexia, and is found only after repeated examinations extending over many weeks and sometimes months.

When there is the question of early differential diagnosis, these cases must be classed as those in which no parasite is found.

With regard to (ii) the finding of pigmented mononuclears—this is not a very great help with regard to differential diagnosis, for pigmented mononuclears are found for months after parasites have disappeared and all clinical signs of malaria have cleared up. We may get cases of typhoid or other fevers showing pigmented mononuclears due to an attack of malaria which had cleared up six months before. That is to say, the finding of pigmented mononuclears is no sign that the patient is suffering from malaria, but only that the patient has suffered from malaria. Moreover, great care is needed to distinguish between the true pigmented mononuclear and the many mononuclears and large lymphocytes which show granules in the cytoplasm. These granules, while undoubtedly pathological, are yet not limited to any particular disease.

In regard to (iii) mononucleosis is more marked after the malaria attack than during the attack. I have noticed that during the attack it is the large lymphocyte which is markedly increased rather than the true large mononuclear.

On clinical examination we find that cases of malaria which present the so-called classic symptoms are the exception rather than the rule. We find that "benign" infections are, as a rule, far more severe than "malignant" ones; we find that quartan triplex is so common an infection that the majority of cases of quartan fever exhibit a quotidian periodicity. But it is in subtertian infections that our greatest difficulty lies. Subtertian malaria is so protean in character, and so confusing and unexpected in its manifestation, that it may simulate any disease. It may exist for years without exhibiting "malignant" symptoms. As regards periodicity, it is a law unto itself. Its periodicity ranges from the rare "classical" forty-eight hour periodicity to a double quotidian periodicity, but its most confusing exhibition is as a quotidian mild paroxysm without ague or as a low continuous fever. It is in this latter form that it tends to be confused, specially with paratyphoid infections. Here are no classical symptoms to guide us, nor are we helped by the therapeutic test, for I have found that many of these cases of low subtertian fever clear up in a few days without any treatment other than rest in bed, and others continue for a couple of weeks, in spite of vigorous quinine medication. These cases are very apt to be confused with mild paratyphoid cases which run a course of from nine to fourteen days.

It is in just these cases, too, that the blood examination may prove disappointing, for the subtertian parasite is particularly infrequent in the peripheral

blood. In such cases we have three important guides to the differential diagnosis.

(1) The general blood picture and differential count.

(2) The temperature chart.

(3) Russo's methylene urine test.

The blood picture of malaria and paratyphoid is very different. Many authorities state that leucopenia is a marked characteristic of malaria blood, but in practice I find that this is not the case. In malaria, leucopenia is sometimes found, but as a general rule it is absent, whereas in paratyphoid it is invariably present after the first forty-eight hours, and is generally very marked (an initial leucocytosis occurring during the first forty-eight hours in paratyphoid is apt to be misleading and should be allowed for).

Progressive mononucleosis is found in both diseases, but in malaria the increase is in large lymphocytes and mononuclears, whereas in paratyphoid it is in small lymphocytes and large mononuclears.

In malaria the eosinophiles are normal or slightly increased, whereas in paratyphoid their percentage is below the normal. It should be noted, however, that the disappearance of eosinophiles is not always absolute in paratyphoid as it is in typhoid. But one of the most valuable indications in my experience in differentiating between a typhoid or paratyphoid and malaria blood is the Arneth count. In typhoid this is invariably very high, whereas in malaria it is normal or low. I have seen cases of typhoid and paratyphoid with an Arneth count of 96.

With regard to erythrocytes, the typhoid, paratyphoid picture is normal in the first few weeks, whereas in malaria there is generally anisocytosis, and distinctive "brassy" erythrocytes are found.

Comparison of temperature charts is not so helpful, but even in the mildest cases of paratyphoid the step-like range is marked, especially as regards morning temperature, the afternoon rise may be irregular, but the morning temperature will be found to advance and recede in steps until it touches 97°. A subtertian malaria morning temperature may oscillate between 100° and 97° for many successive mornings, but it will not retain the gradual and regular upward and downward range that it does in paratyphoid.

Russo's methylene blue urine test is said to be positive in typhoid and paratyphoid, and negative in malaria, but I have not enough personal experience of this test to write with certainty.

Another point of difference is that the paratyphoid pulse is low, while the pulse in malaria is slightly accelerated. I have laid most stress on the differential diagnosis between subtertian malaria and paratyphoid, because in my experience it is between these two diseases that confusion is most likely to arise, and does arise. True typhoid declares itself unmistakably in a very short time, and the rapid and complete disappearance of the eosinophiles is a very valuable indication, especially

in combination with an increased Arneth index. Paratyphoid, on the contrary, may be very mild in character, and may run a very short course lasting about nine days, although the average paratyphoid runs a course of fourteen to twenty-one days.

These mild cases of paratyphoid are generally diagnosed either as malaria or "flu." It has not hitherto been recognized that paratyphoid can run so short a course, and many practitioners still refuse to believe that a fever in which the patient is only really ill for about a week can be paratyphoid.

In regard to differential diagnosis between influenza, paratyphoid and malaria, I do not believe that influenza ever occurs without catarrhal symptoms, though the catarrhal symptoms may be very mild.

Filarial fever is very like that of malaria, as the cold stage with ague is always very marked in filaria, while very often the filarial inflammation is not perceptible, or is so slight as to be easily overlooked. The blood picture, apart from the finding of microfilariae, which are only found in blood taken at night, provides certain indications; a moderate eosinophilia is common in filaria and a slight increase of small lymphocytes, which cells are invariably diminished in malaria. These indications, combined with an absence of "brassy" cells and of anisocytosis, may serve to put us on the track of a diagnosis which may be confirmed by the examination of the nocturnal blood.

Pulmonary tuberculosis is common in the tropics, and there is no disease in which early diagnosis is of greater importance than this. The slight and regular evening temperature of tuberculosis, which in temperate climates at once arouses our suspicions, is too often overlooked in countries where malaria is common. The patient himself, not feeling acutely ill, classes this as a "touch of malaria," doses himself with quinine, and rather prides himself on not taking his temperature. In this way too often the disease is allowed to advance unchecked until the only stage in which cure is possible has passed, and is only diagnosed when it has reached the incurable stage. Examination of the blood in the early stages of phthisis is of great value. Not that we can make a positive diagnosis on the blood picture alone, but that the picture may help us to exclude other causes of pyrexia and may lead us to be on the look-out for the unobtrusive clinical symptoms of early tubercle.

The chief differential features of the malaria and tuberculosis blood picture is: (1) Any continuous malarial fever will produce a decided anisocytosis, whereas in pulmonary tuberculosis anisocytosis is not produced or is very slightly evident until the disease is moderately well advanced. (2) The percentage of small lymphocytes in malaria is invariably very low, whereas in pulmonary tuberculosis it is normal or high, (3) and chiefly, the Arneth index in early pulmonary tuberculosis is invariably high, whereas in malaria it is normal or low.

Briefly, we may say that pulmonary tuberculosis

exhibits an approximately normal blood picture with a relatively high Arneth index, whereas in malaria the blood picture is abnormal, as described in detail elsewhere, with a normal or relatively low Arneth index.

In the more acute fevers due to septicæmia, pneumonia, &c., the blood picture showing marked polynuclear leucocytosis provides an unmistakable clue to diagnosis.

In sepsis due to deep-seated abscess, the clinical symptoms, severe rigors, high fever and sweats are very suggestive of malaria, but the blood picture differentiates the two diseases conclusively.

It will be seen, therefore, that apart from the recognized diagnostic value of finding malarial parasites or microfilarie in the peripheral blood, yet that blood examination has a value which is not fully recognized of providing "pointers" which may guide us to a correct diagnosis in difficult cases.

These "pointers" may briefly be summarized thus:—

I. Absence of eosinophiles combined with leucopenia and a high Arneth index	Typhoid para-typhoid
II. Increase of large lymphocytes. Decrease of small lymphocytes and polynuclears. Eosinophiles normal. Anisocytosis and "brassy" cells. Arneth index normal or low	
III. Polynuclear leucocytosis 80 per cent. or over	Septicæmia, abscess, pneumonia, meningitis
IV. Moderate increase of polynuclears and eosinophiles. No anisocytosis	Filaria
V. Approximately normal. Blood picture with high Arneth index	Pulmonary tuberculosis Ankylostomiasis and other worm infections
VI. Marked eosinophilia	

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AN IMPROVISED ANTISEPTIC ADHESIVE DRESSING.

By J. A. TAYLOR, M.B., D.T.M.

Senior Medical Officer, Uganda Protectorate.

ADHESIVE plaster is apt to deteriorate and become useless after a time in the tropics and it is often convenient to have some substitute on which to fall back in case of need. With this object in view I tried gutta-percha tissue with the ordinary rubber solvents, such as petrol, benzol and chloroform, and found these were more or less satisfactory. Later, however, I came to the conclusion that eucalyptus oil was the best, and for some years I have found this improvisation so useful and convenient to me in many ways that I think perhaps others may also find it so. Since both are used for other purposes eucalyptus oil and gutta-percha tissue are generally obtainable, and if applied with care can be made almost as adherent as ordinary adhesive plaster and in many respects has advantages over the latter: (a) Strips or pieces of any size or shape can be cut from the large sheets in

which the tissue is supplied. (b) If desired only the part actually in contact with the skin need be made adhesive. (c) The oil is antiseptic and sometimes does away with the necessity for any other dressing. (d) By use of more or less oil the amount of adhesion can be regulated. (e) When removal is required this can be effected by use of more solvent without difficulty or discomfort, which is more than can be said of ordinary adhesive plaster.

SOME USES AND METHODS OF APPLICATION.

(1) *As adhesive plaster.*—The gutta-percha can either be cut in strips or in one piece to leave good margins round the dressing. The skin round the dressing is smeared with the oil and the tissue applied. By smearing the upper surface of the tissue it will adhere more firmly but only a minimum quantity of oil must be used or the tissue will dissolve altogether.

(2) *To fix bandaged dressings more firmly.*—On some parts of the body, and especially with children, no matter how well bandaged, movement often causes some displacement of ordinary dressings. This can be prevented by fixing one or more margins of the gutta-percha as described above. A smear of oil on the surface of the gutta-percha will make any cotton-wool applied adhere to it, and there is much less likelihood of the bandage slipping or of the dressing becoming displaced. With wet dressings and poultices by making the gutta-percha tissue adherent all round, moisture and heat will be much longer retained.

(3) *As a protective covering after vaccination.*—Fixed all round as above, but in this case care must be taken to leave a broad margin round the scars or the antiseptic properties of the oil may interfere with the vaccine. This is especially useful with babies and no bandage or other covering is necessary.

(4) *As a finger-stall.*—In the tropics the ordinary rubber finger-stalls have generally perished by the time they are required. By cutting an L-shaped piece of tissue, applying like an ordinary finger bandage and smearing over the edges and margins with oil, a serviceable and presentable finger-stall can be made. It can, of course, be made any size and pulled on and off as required.

(5) *As sole dressing for small clean scratches, cuts or burns.*—Owing to the trouble of putting on more elaborate dressings these are often disregarded with the result that, especially in the tropics, they often become septic and cause eventually considerable trouble. For these eucalyptus oil smeared over the wound and the application of a piece of gutta-percha tissue serve as an admirable protection and hastens healing.

The above are only a few of the uses. There are numerous others, but perhaps better improvisations have been recorded, in which case I trust this short note may be the means of bringing them to light.

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THE JOURNAL OF

Tropical Medicine and Hygiene

JUNE 1, 1921.

A NEW METHOD OF TREATMENT OF TRYPANOSOMES.

DR. CLAUDE H. MARSHALL, Senior Medical Officer, Uganda Protectorate, read a paper on this subject at the meeting of the Royal Society of Tropical Medicine on May 20, 1921. Dr. Marshall is well known as a keen observer, a capable

administrator, and a scientific investigator of repute. He has been since 1914 the Medical Superintendent of Sleeping Sickness measures in Uganda, and has had ample opportunities of studying sleeping sickness, its causes, distribution and its clinical signs and symptoms. Lately he has devoted his attention to the treatment of the disease, and has now put before us succinct and rational deductions which promise to prove of real value in the treatment of the disease.

Dr. Marshall had to hand over his cases to Dr. S. M. Vassallo in February, 1920. It was fortunate so able an observer was at hand to take up the work, but to have one's studies interrupted suddenly, curtailed and practically stopped owing to "the exigencies of the service" is at all times a disappointment which sinks deeply into one's very soul. The observation, clinical and laboratory work carried on by Dr. Marshall has been done in addition to the routine work of his duties as a District Medical Officer. The same was the case with Dr. Vassallo; and in fact is invariably the case with district officers in the Colonial service, in the Army and those in private practice at home. As a rule when practice commences, pathological, bacteriological and laboratory studies generally have to be given up in time. It is a great drawback to the advance of medicine that this must be so, for it tends to and actually does separate clinical medicine from laboratory study, and the work has to be, as a rule, taken up by different men to the detriment of both practitioner and the laboratory investigation. It has ever been so and will remain, and as our knowledge and departments of research increase the divorce between the two will widen and increase.

However, in the present instance it was fortunate to find two medical men endowed with instincts alike and capable of amicably working into each other's hands.

Time was, and only a few years ago, when sleeping sickness was regarded with amusement and treated rather as a joke. Ship captains brought tales of West African natives lying down and dying when they liked. They were regarded as so lazy that rather than work they would lie down and die just to spite their master, &c. Then a parasite was found and the whole aspect of things changed. The disease became of deep interest in medical and scientific circles. Some of the patients were brought to Europe and exhibited; their signs and symptoms, their blood and glands were examined, and became the subject of close laboratory and experimental study. Meanwhile the disease was found to be more widespread than formerly believed, as along the whole length of the Congo, as investigations extended, so evidently did the area of infection. Traffic and opening up the country favours the spread of the disease; and the great leap from the watershed of the Congo to that of the Nile faced mankind with a problem which threatened men and animals of at least three continents.

Dr. Marshall handled the whole matter of the

paper he read before the Royal Society of Tropical Medicine in a masterly manner, and carried conviction to his audience as to the advantages likely to be gained by an official study of the treatment he proposes for sleeping sickness.

The three factors concerned in most infectious ailments are not wanting in the case of sleeping sickness; there is the host, the fly and the parasite—that is the human host, the tsetse-fly and the trypanosome. In attempts to eliminate this disease the human beings may be removed from the tsetse-fly area; or the fly may be deprived of the means of existence; or infected persons may be treated. The first two named may or may not be possible, but it is our duty to treat those afflicted until such times as measures may be taken to perfect the hygienic and sanitary necessary steps to do away with the carrier.

Trypanosomes are met with in the blood, in the lymphatic system, and in the cerebro-spinal fluid. At first drugs were used to destroy the trypanosomes in the blood-stream, and this was apparently successful when by injections of antimony potassium tartrate the trypanosomes disappeared from the blood. After an interval, however, the trypanosomes reappeared in the blood. The trypanosomes it would appear "left" the blood and took up their abode in the tissues around the blood-vessels; but when the antimony salts no longer prevailed in the blood, the parasites found their way back to the blood as if no antimony had ever been given. The next step was to use a drug which would kill the parasites whilst they occupied the perivascular tissues, and Cushny suggested that mercury should be given for that purpose. Then came a number of compound drugs, such as salvarsan, neosalvarsan, atoxyl, &c., to sterilize the blood-stream, but although in all cases the parasites disappeared from the blood for a longer or shorter period, varying from days to months, they reappeared once again in the blood. The explanation of this phenomenon resolved itself under one of two headings, either that the trypanosomes became "atoxyl-fast," or "that some of the parasites are protected from the action of the drug by assuming a secluded position in the central nervous system" (Marshall). It is this latter point which Marshall and Vassallo set out to investigate and if possible to prove, and it must be said their researches have gone a long way (if not conclusively) to prove.

Striking cases of riddance of the glands and their juices and of the blood-stream of trypanosomes by injections of neo-kharsivan are common, but their presence in the cerebro-spinal fluid only has been recorded some three to four months afterwards. Explanation of this is very ingeniously unfolded. Those who wish to follow this explanation must brush up their knowledge of the anatomy of the brain. That wonderful vascular plexus, the "choroid plexus," within the cerebral ventricles, which a few years ago were mere anatomical terms devoid of any physiological attributes, is now found to be the seat of communication between the blood

and the cerebro-spinal fluid; here, according to Vassallo, the meningitis which so frequently (if not always) accompanies trypanosomiasis involves the choroid plexus to such an extent by thickening, that all communication between the blood and the cerebral ventricles is cut off, and the drugs circulating in the blood cannot find their way into the cerebro-spinal fluid, and thereby the trypanosomes lying in a region cut off from the blood-stream are not exposed to these drugs in the blood, and therefore not destroyed. Meningitis is a relatively late manifestation of trypanosomiasis; so that if the meningitis has not yet developed to a degree to shut off the communication by way of the choroid plexus, cures by injections are rendered possible as the cerebro-spinal fluid is also deluged with the drug. But when meningitis has blocked the way for the drug to reach the cerebro-spinal fluid it is necessary to try other methods. This was done as follows:—

An intravenous injection of neo-kharsivan was given, and three hours later 2 oz. of the blood were drawn off into a sterile covered vessel, which was left standing in a bowl of cold water for twenty hours, by which time the clot had separated. Twenty minims of the clear serum were then injected into the spinal canal, after a corresponding amount of spinal fluid had been drawn off by lumbar puncture.

This patient—a woman—was a well-marked case of sleeping sickness, trypanosomes being easily found in the large typical glands in the neck, and, though she has had no more treatment of any kind, and has been examined at intervals of three months, her blood has remained negative. When seen in December, 1920, twenty-seven months after treatment, she was quite well. Her blood and cerebro-spinal fluid were then negative, and the glands in the neck, which had completely disappeared soon after the injection, had not reappeared.

It is impossible to deal with the whole subject or to quote the cures in which this treatment was tried. Those present at the meeting on May 20, 1921, at the Royal Society of Tropical Medicine were so impressed with the measures recommended by Drs. Marshall and Vassallo that they resolved that steps should be taken to test the method more widely, and we are rejoiced to know that active steps are being taken to send out an expedition to Uganda and neighbourhood.

This subject will be dealt with in a future number of the Journal.

Annotations.

Notes on Iodosalyl in Human Trypanosomiasis (A. Dubois, *Annales de la Société Belge de Médecine Tropical*, No. 1, November, 1920).—At the request of the Belgian Government the author made in 1913 experiments in trypanosomiasis with iodosalyl which was believed to have great therapeutic and prophylactic value. It was tried in three cases, three doses of 10 c.c. each being given

by intramuscular injection. The patients bore the doses well, but the reaction remained positive, sterilization not being obtained. The author considers that arsenics and atoxyl are considerably more useful.

Types of Pneumococci in the Throats of One Hundred Normal Persons (Jacob Meyer, M.D., *Journal of the American Medical Association*, vol. lxxv, No. 19, 1920).—The present study was made on 100 normal individuals of varying ages, in whom no history of contact with an acute or recent case of lobar pneumonia could be obtained. The work was carried on during February, March and April, 1920, following the epidemic of influenza in Chicago. Swabs from the pharynx and tonsils were spread on 5 per cent. goat's blood agar plates and incubated for from twenty to twenty-four hours. Colonies resembling the pneumococcus were inoculated in plain broth and the organisms tested as to bile solubility and fermentation of inulin. Bile solubility was determined by adding one part of fresh sterilized ox bile to four parts of a broth culture and incubating the mixture for one hour. Type determinations were made by the precipitin and agglutinin methods.

Pneumococci were found in twenty-one instances. Types I and II were not found in any case. Type IIA was isolated once. Type III occurred in three instances, and Type IV in seventeen. The organism identified as Type IIA by the precipitin method was bile soluble, but did not ferment inulin. Of the seventeen strains of pneumococcus Type IV, eight were apparently more readily soluble in bile than the remaining nine. As the diagnosis of this group largely depends on the bile reaction, the bile test was repeated. All seventeen strains were found bile soluble, but the results did not correspond closely with those obtained when the organisms were first isolated. Keegan found "that the differentiation of Type IV pneumococcus, and the pleomorphic forms of *Streptococcus viridans* is not without difficulty, and that some may be found to fall within the *S. viridans* group." Bile solubility tests of broth cultures were not found very reliable from the identification of the pneumococci, some of the fixed types identified by agglutination not showing distinct bile solubility. Similar observations were noted by Nazum, who found that pneumococcus Type IV and allied green-producing organisms varied as to bile solubility and inulin fermentation. Tunnickiff has recently made similar observations as to the green-producing cocci in influenza. The present observations point in the same direction. Attention is also called to the difficulty in differentiating colonies of pneumococci from colonies of *S. viridans*. The author therefore considers it quite probable that the variations in the percentage of pneumococcus Type IV found in normal persons may be due to difficulties of differentiation between pneumococci and green-producing streptococci.

Abstracts and Reprints.

THE WEIL-FELIX REACTION AS A LABORATORY TEST IN THE DIAGNOSIS OF TYPHUS FEVER.¹

By IDA A. BENGTON.

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THE Weil-Felix reaction, which has recently come into use as a means of diagnosing typhus fever, is of special interest in that an organism which has not been shown to be etiologically concerned in the disease can nevertheless be used for the diagnosis of typhus fever in the same way that the typhoid bacillus is used in the diagnosis of typhoid fever by the well-known Widal test.

The organism, designated as X₂, which closely resembled the proteus type of organisms culturally and serologically, was agglutinated by the serum of eight similar cases, and later it was demonstrated that the serum of many undoubted typhus cases showed agglutination with this organism. Another strain, X_{1a}, which was more sensitive to agglutination, was later isolated by the same workers.

The organism first isolated by Weil and Felix is described by them as a short, thin, proteus-like, Gram-negative rod, which is slightly motile, forming blue colonies on Conradi-Drigalski medium, and colourless colonies, which later become red on endo-medium. It ferments glucose and lactose (?), and produces an acid reaction in litmus milk, followed by curdling; it liquefies gelatine and grows like proteus in plate cultures.

Cultures of the two organisms X₂ and X_{1a}, were recently received at the Hygienic Laboratory through the courtesy of Dr. C. Alsberg, Chief, Bureau of Chemistry, and were compared as to cultural and agglutination reactions with a number of proteus strains which form part of a collection recently studied by the author. While the cultures resembled these strains in important points, there were certain differences, in degree rather than in kind, of certain reactions. This was particularly true as regards proteolytic activity. Gelatine was liquefied more slowly and to a much less extent than by typical *Proteus vulgaris* cultures, litmus milk was decolorized, and the casein digested slowly, and blood serum was not digested in fourteen days, while five *P. vulgaris* cultures showed complete digestion in seven days. Indol was formed in peptone broth, and nitrates were reduced to nitrites and ammonia. Acid and gas production were observed in glucose, saccharose and maltose, but not in lactose, mannite or raffinose media. The fermentation reactions correspond to those of one of the two main types into which *P. vulgaris* strains fall, it having been observed that one type fermented only glucose, while the other fermented

¹ Abstracted from the Public Health Reports, October 31, 1919.

also saccharose and maltose. Wenner and Rettger propose the name *Proteus mirabilis* for the latter type.

A study was also made of agglutination reactions, and it was found that the organisms X_2 and X_{11} were agglutinated strongly by the immune sera produced from certain *P. vulgaris* strains and not at all by others. Also, immune sera produced from X_2 and X_{11} agglutinated certain *P. vulgaris* cultures, but not others. This is somewhat in accord with the findings of Weil and Felix, who divided non-specific proteus strains which do not agglutinate with serum from typhus cases into three groups: (1) Strains not agglutinated by rabbit immune sera from X strains; (2) those feebly agglutinated; and (3) those strongly agglutinated. None of the proteus strains which they term saprophytic was agglutinated by the serum of typhus fever patients.

The question of the relationship and significance of organisms of the type X_2 and X_{11} to typhus fever is debatable. Weil and Felix and other Austrian authors, as well as certain English authorities, ascribe the agglutinating properties of the serum of typhus patients to the presence of the organism as a secondary invader. A compilation of the successful isolations of the organism from the blood and urine of typhus patients by Felix shows that the organism was isolated forty-four times from several hundreds of cases.

The presence of immune bodies other than agglutinins, particularly complement-fixing bodies, has been investigated with a view to establishing the relationship of the X strains to typhus fever, but uniform results have not been obtained. Craig and Fairley, and Fairley, as a result of their investigations and failure to demonstrate complement-fixation with antigens of the X strains, consider the secondary invasion hypothesis untenable. In Fairley's investigation it was shown that sera from undoubted typhus cases agglutinated the organisms regularly, but complement-fixation was nearly always absent (fifty-five out of fifty-eight cases negative). As further evidence of non-specificity, it is reported that serum of man and monkeys inoculated subcutaneously with the X strains showed not only agglutination but complement-fixation. Fairley explains the Weil-Felix reaction as due to the presence of secondary or heterologous agglutinins formed by the specific agglutino-gen. He states that a review of the literature discloses the fact that the sera of typhus cases must be especially rich in secondary agglutinins, as agglutination of *Bacillus typhi-exanthematici* (Plotz), *B. typhosus*, *Bacillus "U"* of Wilson has been described as well as that of the X strains of Weil and Felix. Reichenstein and Wagner, on the other hand, report positive complement-fixation, the former in 40 per cent. of cases tested, and the latter in all of the six cases tested. The evidence thus far presented does not appear to be sufficient to show conclusively the exact relationship of the organism to the disease.

As to the constancy of the reaction, it apparently

is of such a degree that the reaction is of very considerable value in the diagnosis of typhus fever. The recent work of Fairley carried out in Egypt demonstrates this. The sera of sixty-three out of sixty-five, or 97 per cent. of cases, showed positive agglutination reactions with the organisms, while out of 120 non-typhus cases no positive agglutinations were obtained in a dilution of 1:20. Weil and Felix, in one of their earlier reports, state that 125 positive reactions and one negative reaction were obtained in 126 clinically positive cases of typhus fever. In 632 control sera from other diseases, including typhoid fever, variola, meningitis, and relapsing fever, about 12 per cent. showed positive reactions in a dilution of 1:25 of the serum, but in practically all cases agglutination was incomplete and delayed.

The reaction appears during the first week of illness, but it is at its height during the second week and during convalescence. Thus, Fairley has shown that thirty-five cases examined during the pyrexial period showed agglutination in dilutions of 1:20 to 1:1280 between the fifth and thirteenth days. Convalescent cases showed agglutination for a longer period than twenty-two days. A limited number of mild cases have failed to show positive reactions, and it was also found by Weil and Felix that the reaction sometimes failed in severe cases.

The technique of the test as recommended by Weil and Felix is as follows: A freshly grown agar culture is used, the growth suspended in 1.55 c.c. of salt solution, and tests made with 1:25 on the sixth day to 1:200 to 1:500, or higher, on the twelfth day. If the titre is 1:25 on the first test and does not rise higher, typhus may usually be excluded. The use of killed culture antigens has been advocated by others. Jacobitz states that the agglutinability of the organism is increased by exposure to a temperature of 60° C. for one hour. An alcoholic preparation of antigen, which is said to keep for two years, has been advocated by Sordelli, and has been used by Kraus in South America and by others.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.
No. 2, February, 1921.

The Diptera and Tropical Pathology (E. Roubaud).—Traces briefly the relation between the various sub-orders of the order diptera, from the mosquito to the common fly, and thence to the highest development in the paradoxical form of the wingless pupipara. As regards the disease-spreading powers of the diptera, the author shows the importance of a close study of the habits of each particular species in the interests of prophylaxis; recalling in this connection, by way of example, the tendency of stegomyia, the carrier of yellow fever, to select the bottom of domestic vessels, such as flower vases, for laying purposes, of *O. irritans* to deposit its larvæ in the nests of earth crabs, and of other species of culicidæ to lay their eggs on dry ground

in localities where water is likely to reach them in time of flood.

On the Presence of Cryptococci in the Digestive Tube of a Lymphangitic Horse (M. Descazeaux).—The horse, which was recovering from epizootic lymphangitis, died from gastro-intestinal indigestion—a diagnosis confirmed at autopsy. Cryptococci were found not only in the specific lesions but in the digestive tube also, where they appeared to be saprophytic. Though he believes this to be the first case of the kind recorded, the author considers it is probably not an isolated one. Using every known method of favourizing growth in cultures, he himself was unable to discover another instance among the horses under treatment, but the large quantity of material excreted rendered the search difficult.

He suggests that the organism may have been conveyed into the intestinal tract in foreign wheat or through the intermediary of filaria (a tumour containing habronema was present in the large intestine) or flies, in which event the theory regarding the infection of wounds by straw bedding and excreta would receive further substantiation.

The Leucocytic Formula in Malaria as seen in Dakar (A. Esquier).—In twenty-five cases of primary tropical malaria the average leucocyte count during the attack showed a tendency to polynucleosis. The highest number of polynuclears was 86.2 per cent., the lowest 64.2 per cent., and the mean 75.272 per cent. The possible sources of error were as follows: (1) a doubt as to whether the blood was invariably taken at the height of the fever; (2) the difficulty of entirely eliminating the quinine factor, (3) the different opinions prevailing among hematologists as to the formula for normal blood. As his findings are in disagreement with accepted theories, the author would like to see them confirmed or contradicted by further research.

Experimental Study of Malaria. Bird Malaria (Plasmodium relictum) (Etienne and Edmond Sergeant).—Practical experiments on man being impossible, if only on account of the necessity for controls, and human malaria not being transmissible to animals (except anthropoids), the authors have tested quinine prophylaxis on the disease of birds due to *Plasmodium relictum*, a near relation of the plasmodium of human malaria. The virus used was obtained from an Algerian sparrow and the subjects treated were canaries bred in captivity. It was found that a daily dose of 0.7 mg. of quinine hydrochloride, injected subcutaneously, prevented the disease from developing in an inoculated or reinoculated bird. Nevertheless the infection appeared to be latent only and sometimes broke out if the administration of quinine was discontinued; the blood of such birds was infectious for fresh ones. The immunity conferred was therefore relative. Tests to decide when prophylaxis might usefully begin showed that quinine should be given and continued without interruption immediately after reception of an infecting bite but not before. As regards the effect of quinine upon the virus, a six months' course steril-

ized the blood of two birds out of eight, and procured an attenuation of the virulence in the other six which extended to the second and third generations after inoculation into fresh birds. Other remedies were tested, but none were so effective, either prophylactically or curatively, as quinine. Experiments in many methods of vaccination were undertaken, the only results worthy of notice being the following: (1) Sporozoites preserved *in vitro* for from twelve to forty-eight hours, inoculated into twenty-four birds, procured immunity in 29.5 per cent.; (2) *Plasmodium* taken from the blood during the incubation stage of the infection gave immunity in 21.30 per cent. (61 subjects). Of the control birds 99.28 per cent. showed a heavy infection after one inoculation.

Disappearance of Quinine Hæmato-hæmoglobinuria after Treatment with Novarsenobenzol (G. Doré).—In a soldier suffering from chronic malaria of undetermined type intravenous injections of quinine (collobiase) were followed by hæmaturia and hæmoglobinuria of increasing violence until discontinuance of the treatment after the eighth dose. These phenomena were accompanied by enlargement of the spleen. Arsenobenzol treatment was instituted with some hesitation, partly because of the methæmoglobinuria sometimes produced by the drug when used in syphilis, and partly because of its stimulating effect upon *P. vivax* as noted by Caille. The first injection provoked a typical malarial attack, but no blood or hæmoglobin appeared in the urine; after two further doses at intervals of four days the patient was discharged from hospital with a spleen of almost normal size.

Medical News.

A REMEDY for bedbug infestation of beds, rooms, &c., has been devised by R. H. Pettit ("Notes on Two Insecticidal Agents," 10th Report, *Mich. Acad. Sci.*, 1908), as a substitute for hydrocyanic acid gas and sulphur, and is reported to have proved very successful.

It is an extract prepared by washing 400 grm. of pyrethrum with 2,000 c.c. of strong alcohol and then adding 50 grm. gum camphor; 150 c.c. cedar wood oil; 25 grm. oil citronella; 25 grm. oil lavender. The application is best made with a large-sized atomizer. Usually one application, if thoroughly made, is sufficient, about 8 to 10 oz. being required in an average sleeping room. The odour remains some little time in the room, but is not disagreeable.

Sanitary Train for Typhus Fight.—The American Red Cross has loaned to the Czecho-Slovak Government and the Czecho-Slovak Red Cross the services of a sanitary train to fight typhus fever in Eastern Slovakia and Ruthenia. The train consists of six cars containing a hospital of twelve beds, a small operation room, a pharmacy and ambulance for the transport of patients.

Original Communications.

ON THE MECHANISM OF IMMUNIZATION.

WITH SPECIAL REFERENCE TO LIPASE.

By J. A. SHAW-MACKENZIE, M.D.Lond.

IN a paper, "The Treatment of Leprosy," read before the Calcutta Leprosy Conference, Lieut.-Colonel Sir Leonard Rogers, [1] F.R.S., refers to his discovery that the power of derivatives of chaulmoogra oil, and also of the *hydnocarpus* series of oils, to destroy acid-fast bacilli, is "in no way specific to that group," but is also possessed by an animal product, cod-liver oil. "This newly-discovered property, therefore, appears to reside in the unsaturated fatty acids as a class, which opens up an endless field of investigation."

This field of investigation is of especial interest to me, as for many years my attention has been concerned with the enzyme lipase, the fat-splitting ferment, and from experimental work I have concluded that its increase or production in the tissues is an important factor in the defence of the body against cancer and bacterial invasions; and that in induced tissue lipolysis an explanation in part is afforded of natural and therapeutic immunization [2]. That is to say, the idea or principle underlying treatment is the production of the lipolytic ferment in the tissues, which in tuberculosis acts on the fats and lipoids of the tubercle bacillus and is injurious to it; and presumably also in leprosy on the lepra bacillus, though in this direction I have had no opportunity of investigation. This protective mechanism may be due in part to the actual products of fat-splitting—namely, the fatty acids or their sodium salts or soaps of common vegetable oils and fats of the animal body, but have been regarded and indicated by me amongst the substances which increase the lipolytic or protective mechanism.

SUMMARY OF INVESTIGATIONS.

The results of my work, carried out in the physiological and bacteriological laboratories, King's College, have been published from time to time, and may be briefly summarized as follows:—

Glycerin extracts of pancreas are strongly lipolytic (and tryptic) and remain active for years. When serum is added to such extracts, or to pancreatic juice itself, fat-splitting is markedly accelerated. The serum itself does not split fats, but contains an activating agent. Variations in the power of the serum to accelerate or activate lipase occurs in disease. In progressive and advanced cancer, this power of the serum is decreased. Accompanying improvement or recovery the accelerating or activating action on lipase returns to normal, or is increased; a similar increase is noticeable in mice which have proved "negative" to mouse tumour inoculations or have recovered spontaneously from well-marked growths. These reactions are not specific to cancer. The

same holds good in the acute and convalescent stages of cases of infectious disease which I have examined. In 1912, I showed that in recovered tuberculosis the serum has the power of markedly increasing the action of lipase. Somewhat later I found that this power was decreased in the acute stages. These experiments have been repeated by me more recently with results which fully confirm my earlier ones.

There are a number of substances, of which the most familiar are the bile salts, which have the power of increasing the fat-splitting action or the power of the serum, *in vitro* and *in vivo*, and this property is shared by the sodium salts of the fatty acids or soaps of olive oil and fats of the animal body. In this respect I have not found any particular differences between the saturated and unsaturated fatty acids. Cholesterol, on the other hand, inhibits this action.

Rosenheim [3] found that the lipase contained in glycerin extracts of the pancreas could be separated into two parts by filtration. The residue on the filter (*inactive lipase*) is destroyed by heat; the other component in the filtrate (*co-enzyme*) is thermostable. Each by itself has no action on fats, but on mixing the two together the fat-splitting action is raised to its original value. Subsequently I adduced evidence that the lipase of the juice is separable into these two components, and that most of the enzyme in the freshly secreted juice is in an inactive condition (*pro-lipase*) [4]. There are a number of substances and tissue extracts which can take the place of the pancreatic co-enzyme. Serum itself, when substituted for the co-enzyme, has a very marked activating action on the inactive pro-lipase. The chemical nature of the substance in the serum responsible for this activating property is uncertain, and there may be more than one co-enzyme present. In this way, I believe that the introduction of a normal or specific activator or co-enzyme into the blood activates the pro-lipase of the tissues, which being common to all and thermostable may be compared to complement. I found in my experiments that this is actually what did occur—namely, the addition of pancreatic co-enzyme, and of sodium oleate to serum exerts *in vitro* a lipolytic action.

LIPASE IN THERAPEUTIC IMMUNIZATION.

The same increased accelerating action of the serum noted in recovered tuberculosis is noticeable in diphtheria after improvement due to antitoxin, compared with the decreased power in the acute conditions before treatment. The same is witnessed in scarlet fever, in which I have examined the blood, week by week, from the commencement of the attack to convalescence. The same principle of stimulation of lipolytic activity in part underlies treatment by vaccines and tuberculins in which thermostable co-enzymes are present [5]. These *in vitro* increase the fat-splitting action of lipase, but their power in this direction is less than that of normal serum. The addition of staphylococcus

vaccine to serum *in vitro* exerts a lipolytic action, and as I have shown (one experiment), the serum so treated has bactericidal properties towards streptococcus. In drawing attention to this interpretation of the action of vaccines and tuberculosis, I suggested at the same time that the products of ferment and bacterial digestion might prove more serviceable than vaccines. In this connection the serum of patients recovered from infectious diseases contains, as I concluded, the products of digested or partially digested bacteria.

A relationship in the same way between lipolytic activity and bactericidal power on tubercle bacilli has been shown by others.

Attention may be drawn here to the work of J. W. Jobling and W. Petersen [6].

These observers have pointed out that in experimental animals, the intravenous injection of bacteria, protein cleavage products and other substances "is almost invariably followed by more or less marked mobilization of serum protease and usually of lipase (esterase). In the patient a similar reaction occurs, but not in the same degree, nor with the same regularity as in animals. . . . In the ultimate analysis of course we must turn to ferments of this nature for the attack on the invading organism, because it is more than probable that the actual surface of the bacterium consists largely of lipoids, or intimate lipo-protein combinations, for the destruction of which fat-splitting ferments are essential. In certain infections with lipid-rich organisms such as tubercle and lepra bacilli, the clinical demonstration of the association of a high lipase titre in the serum with a favourable prognosis has been well established."

FATTY ACID THERAPY. CANCER.

A protective action of the products of fat-splitting (the fatty acids or their sodium salts) has long been suggested in connection with the cancer problem. In 1913 Freund [7] concluded that the tissues of the body possess in their content of fatty acids a destructive mechanism against cancer cells. Freund and G. Kaminer found that normal serum destroys cancer cells, and acts so deleteriously that inoculation with cancer tissues so treated does not "take"; that in cancer serum a lessening of the amount of fatty acids is found; and that in chronic irritation (chronic ulcers), or as is produced by excessive use of Röntgen rays and chemical irritants, a deficiency of the normal fatty acids predispose to cancer.

Previous to this, in 1901, a deficiency of bile salts and soaps, local or general, as a cause of cancer, was suggested by the late John Holden Webb [8] (Melbourne), whose work I drew attention to in 1906 [9]. He was the first to treat cases of inoperable cancer with cholesterin, on the assumption that loss of cholesterin from the normal cell was a determining factor in the cell proliferation of cancer. Later he abandoned the administration of cholesterin in favour of its solvents, sodium oleate and purified ox-gall. There is no doubt he obtained some successful results by these means, especially in uncomplicated breast carcinoma. I obtained myself marked palliative results in certain cases, but my experience of the method was a limited one, and I am not sure if I employed sodium oleate

in sufficient dosage. The dose recommended was 30 to 60 minims of a 0.8 per cent. sterilized sodium oleate solution; this was injected subcutaneously in the neighbourhood of the growth in sound tissue, preceded by a little eucaine, and repeated every fourth day or so. This dosage, however, is considerably under the toxic dose of sodium oleate in saline administered intravenously in animals. By this route, clinically, 2 c.c. of a 2 or 3 per cent. strength of sodium oleate or animal soap, weekly, appears to be satisfactorily tolerated.

FATTY ACID THERAPY. LEPROSY AND TUBERCULOSIS.

In these directions the work of Sir Leonard Rogers on the treatment of diseases due to acid-fast bacilli by sodium salts of unsaturated fatty acids is of the greatest interest and importance. He was the first to suggest "sodium gynocardate" and "sodium hydnocarpate," the soluble sodium salts of the fatty acids of chaulmoogra oil and of the closely related hydnocarpus series of oils, by intravenous injection. The promising results obtained by him in this way in the treatment of leprosy led him to extend the treatment to tuberculosis, and to his introduction of "sodium morrhuate," the sodium salts of the fatty acids of cod-liver oil (and their derivatives), and to other oils, including soya bean, in the treatment of tuberculosis and leprosy. In a recent paper, "The Treatment of Leprosy and Tuberculosis with Sodium Gynocardate," read before the Royal Society of Medicine (Section of Therapeutic and Pharmacology), he [10] brings forward further evidence of the value of sodium gynocardate and sodium morrhuate in the treatment of leprosy and tuberculosis. He refers again to an action of the chaulmoogrates on acid-fast bacilli, which property is not apparently possessed by sodium morrhuate. He refers to the work of Walker and Sweeney [11], who claim that the fatty acids of the chaulmoogra series alone possess a specific bactericidal action on acid-fast bacilli, which specific action, according to them, is not possessed by sodium morrhuate nor "by implication the unsaturated fatty acids of any oil."

The destructive action of sodium gynocardate is therefore attributed by Sir L. Rogers and by Walker and Sweeney, on the one hand, to the action of the fatty acids of chaulmoogra oil on the acid-fast bacilli, and, on the other hand, by me in part to stimulation of lipolytic activity in the tissues and the action of the ferment on the fats and lipoids of the bacilli.

I propose, therefore, to take up briefly some of these points.

Destructive Action of Chaulmoogrates on Acid-fast Bacilli.—The conclusions by Sir L. Rogers appear to be based on microscopical evidence of broken up bacilli, taken from patients undergoing treatment. Obviously this does not exclude a destructive action due to increased lipolytic activity in the tissues and fat-splitting action. The bactericidal action claimed by Walker and Sweeney is

based on the action of the chaulmoogrates on the bacilli, *in vitro*. The results are striking, but it would perhaps be more convincing if such bactericidal action is demonstrable *in vitro* in blood itself.

Action of Sodium Morrhuate.—If sodium morrhuate has no direct bactericidal action, but nevertheless beneficial results follow its employment, the position in favour of a stimulating action on tissue lipolysis seems to me to be strengthened.

In these circumstances I have thought it might be of interest to investigate the action of sodium gynoecardate and sodium morrhuate on lipase. Systematic investigation of sodium oleate had previously shown that the accelerating action on extract of pancreas varies considerably according to the percentage strength of the solutions used; graduated amounts added to the extract show also a gradual rise in values up to a maximum, falling ultimately to nothing. I chose, therefore, a 0.9 per cent. solution of sodium oleate which had given good results formerly, and the same percentage solutions of sodium morrhuate and sodium gynoecardate, using 1 and 2 c.c. amounts of these solutions.¹

I need not here go into details of technique described in my previous papers, but I may explain briefly that the lipolytic action is estimated by the amount of decinormal potash required for the neutralization of the fatty acids set free by pancreatic lipase acting on olive oil emulsion; the mixture is incubated at 37° C. for a certain time, usually eighteen hours, phenolphthalein being used as indicator in the titration; it is essential that a good olive oil and emulsion be used.

In the following typical experiment 1 c.c. of glycerin extract of pig's pancreas diluted with 2 c.c. water and 5 c.c. olive oil emulsion were used; the results are given in the following table [12]:—

	c.c.	N/10 KOH required c.c.
Pancreatic extract alone on olive oil emulsion	—	24.7
Addition of sod. oleate to extract ...	1.0	37.9
	2.0	39.5
„ „ morrhuate ...	1.0	37.4
	2.0	39.6
„ „ gynocardate ...	1.0	35.2
	2.0	37.4

Two other experiments gave precisely similar results. It will be seen that all three salts exert marked accelerating action on the lipase of extract of pancreas. There is apparently no difference in this respect between sodium oleate and sodium morrhuate, though both are slightly higher than sodium gynocardate. If one considers the action of sodium oleate *in vivo*, it would seem reasonable to infer a direct stimulating action primarily of tissue lipolysis in explanation of the therapeutic effect of sodium morrhuate, and at any rate partial explanation of the therapeutic effect of sodium

gynocardate. The presence of proteins or lipoproteins in the tubercle bacillus naturally does not exclude the action of proteolytic ferments secondarily, evidence of which and of such induced tissue ferments I have adduced and indicated in previous communications.

If I am right, it is obvious that search may be directed further to substances and agents which in particular increase tissue lipolysis in the treatment of infections due to the acid-fast bacilli and their secondary bacterial invasions. It is, moreover, difficult to get away from the idea that the sodium salts of the fatty acids or soaps of common animal fats of the body may be usefully employed—if too we can employ a physiological agent or natural constituent of the body, or produced by an exaggeration of the physiological factors involved.

The opportunity for actual observation in this direction on the clinical side has recently been afforded me. In three cases of active pulmonary tuberculosis, treatment by intravenous injections of common animal soap have been used. No definite difference in the general condition of the patients was evident after three months' treatment. Examination of the serum, however, has shown that the power of the serum to accelerate lipase increased, but still below normal, compared with the decreased power of the serum before treatment, compared in each case with normal serum examined at the same time and under the same conditions of experiment. The time, however, in these cases was taken up in determining dosage. Commencing with small doses, 2 c.c. of 2 and 3 per cent. strength solution, injected intravenously, appears to be safely tolerated.

I have notes of two other cases of pulmonary tuberculosis in which striking results have appeared to follow similar injections. In one of these cases under Dr. L. C. Dundas Irvine, Amersham, 2 c.c. of a 2 per cent. strength, twice a week, and later 2 c.c. of a 3 per cent., weekly, have been employed. Briefly, after six months, no active signs of disease formerly are now present, with freedom from cough, sputa, and night sweats. In the other case under Dr. C. W. Anderson, Poyntzfield, Ross-shire, a similar result has been obtained, the patient having gained 11 lb. in weight since commencement of treatment in October last.

Some experiments I have commenced, but not completed, suggest that the phosphorized fats (phospholipins) may be even more important than the ordinary fats. One of these, lecithin, is certainly split by lipase and accelerates the activity of that enzyme. It is well known that fats of this nature are important constituents of cells especially in their surface layers, and are described also in the composition of the tubercle bacillus. It is, however, too early as yet to make any positive statements, and although I have been successful in preparing soaps from dead tubercle bacilli—and similar soaps might be prepared from tuberculous and leprous tissues—it is not impossible better means than saponification are desirable of treating such fatty material for therapeutic purposes.

¹ In the present state of our chemical knowledge of chaulmoogra and cod liver oils, it seemed sufficient to make no attempt to work with equal molecular weights.

SUMMARY.

(1) An increase or production of lipase or fat-splitting ferment in the tissues is an important factor in the defence of the body in cancer and in bacterial invasions.

(2) In induced tissue lipolysis an explanation in part is afforded of natural and therapeutic immunization.

(3) Stimulation of lipolytic activity in the tissues and destructive action of the lipolytic ferment on the fats and lipoids of acid-fast bacilli is suggested in explanation of the beneficial results of sodium morrhuate, and in partial explanation of the therapeutic effect of sodium gynocardate obtained by Sir L. Rogers in the treatment of leprosy and tuberculosis.

(4) The sodium salts or soaps of the fatty acids of common animal fats may be usefully employed in the treatment of tuberculosis, and presumably of leprosy.

(5) The lipoids may possibly be employed with advantage.

(6) Therapeutic preparations derived from the fatty material of tubercle bacilli, tuberculous and leprosy material are indicated.

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A CASE OF SPONTANEOUS RUPTURE OF THE SPLEEN IN A WEST AFRICAN, WITH REFERENCES TO RECENT LITERATURE BEARING UPON RUPTURE OF THE SPLEEN, AND SOME COMMENTS THEREON.

By A. INGRAM.

West African Medical Staff.

A SMALL Kroomboy, aged about 12 years, who attended school in Accra, was found dead on the morning of June 24, 1920, having retired to rest the previous night without complaint and appar-

ently in his usual health. He had attended school on June 23, and according to his friends there were no signs or symptoms of illness upon his return and he appeared in good spirits, taking his food and retiring for the night in his customary manner. Subsequent inquiries made by the police produced no evidence of injury while at school, moreover his people were convinced that he had shown no signs of illness for weeks prior to his death.

At the post-mortem examination the peritoneal cavity was found to contain 18 oz. of blood and blood clots were adherent to the spleen. The spleen was considerably enlarged, weighed 245 grm. after being freed from blood clots, and measured 14.5 cm. × 10 cm. × 3.5 cm. There was a longitudinal rent running parallel with and lying immediately posterior to the hilum; it was almost 4 cm. in length. The organ was very soft and friable, and slight tearing of the external surface, near the upper pole, which was adherent to the diaphragm, was unavoidable in removing it from the body.

None of the other viscera of the abdomen or of the thorax showed any gross pathological lesion.

The available reports of 613 autopsies of the bodies of natives made in Accra during the last 8½ years have been examined, but no record of any other instance of rupture of the spleen, traumatic or spontaneous, appears. In twenty-two cases gross bodily injuries were inflicted as a result of being run over by railway trains and motor-cars, or of being crushed under heavy loads falling from a height in the act of discharging cargo from steamers. In two of such cases rupture of the liver is recorded, in two rupture of the colon, in one rupture of the kidney, in one hernia of the stomach and a portion of the liver into the left pleural cavity. Yet the spleen escapes unscathed, suggesting that the liability to rupture of this organ in natives of the Gold Coast is slight as compared with that of coolies in the East.

The experience of medical men who have practised in the tropical and sub-tropical parts of Asia would appear to indicate that rupture of the spleen is by no means an uncommon occurrence, and that the liability of this organ to rupture is commonly attributable to previous infection with malaria.

Taylor [1] states that rupture of the spleen assumes in malarial countries an importance it can hardly lay claim to in non-malarial districts owing to the fact that when enlarged, as it frequently is from malaria, very slight violence is required to cause a rupture which untreated may prove fatal. Buchanan [2] remarks that rupture of the spleen being an injury of rare occurrence in England has received but little notice in British text-books of medical jurisprudence; in India, however, it is extremely common and is constantly appearing in the law courts as the cause of death. So common is it that, according to Buchanan, in the case of sudden death in a native rupture of the spleen might safely be presumed to be the cause, and that in cases where a European is charged with causing the death of a native by a blow or a kick it is

almost invariably found that the spleen has been ruptured as the result of a degree of violence which would have no effect on a healthy person.

Manson [3] writes: "Enlarged spleens are easily ruptured by a blow on the belly. In hot and malarious countries many a coolie goes about doing his work although he has an enormous spleen. This is a fact to be remembered in administering even mild corporal punishment to natives of malarious countries."

Waddell [4] tells us that in India the liability of the enlarged spleen to rupture easily is taken into account judicially in awarding punishment in cases where a blow or a kick has caused death.

The same liability to rupture of the spleen as a result of what appear to be trivial blows and inadequate traumatism exists in China, to judge from an article [5] in the *Indian Medical Gazette* which gives a summary of experiences in China with regard to rupture of the spleen extracted from the *China Medical Journal* of January, 1917. In Hong-Kong between the years 1888 and 1896, Cantlie [6] came across seven cases of rupture of the spleen on the post-mortem table. In Malay, Hennessy [7] gives his experience of the surgical aspect of ruptured spleen at the General Hospital, Kuala Lumpur, extending over a period of two years during which nine cases were treated.

Crawford [8], whose statistics are quoted in the majority of English text-books of medical jurisprudence, examined 9,876 reports of medico-legal cases in Bengal, and found that in 304, or 3.08 per cent., the cause of death was ruptured spleen, and that in only eight of these 304 cases was the spleen of normal size.

Massari [9] is of the opinion that most of the recorded cases of ruptured spleen have been discovered only at autopsy, and with a view to early operation urges the necessity of bearing in mind the liability of the spleen to rupture from slight traumata and the increased likelihood of this occurrence owing to the large number of cases of malaria resulting from the war; he records twenty-one cases operated upon, of which fourteen recovered.

It seems legitimate to conclude from the foregoing statements that rupture of the malarial spleen as the result of injuries is common, especially in the East, yet Castellani and Chalmers [10] maintain that, whilst rupture of the spleen as a result of blows or injuries is by no means unknown it is not common, and mention that in their experience they had only come across one case.

Spontaneous rupture of the spleen is by all accounts a rare event, but records of so-called "spontaneous" rupture of this viscus can be found in medical journals readily enough, especially as a result of recent war conditions. Its rarity appears to depend upon the interpretation of the word "spontaneous," i.e., whether it connotes the organ or the individual.

Osler [11] considers that spontaneous rupture of the spleen in cases of acute enlargement during typhoid fever or malaria is very rare. Manson

(*op. cit.*, p. 97) remarks that "apart from direct violence an enlarged spleen may rupture spontaneously owing to a sudden accession in size in the course of a fever fit."

Waddell (*op. cit.*, pp. 130-131) gives details of three cases of spontaneous rupture of the enlarged spleen; and Buchanan (*op. cit.*, p. 843) mentions five cases, of which one is obviously identical with one of those detailed by Waddell.

Noland and Watson [12] consider that spontaneous rupture of the spleen occurring during attacks of malaria or as a sequela of a malarial infection is sufficiently rare to justify reporting such cases. They give the history of three cases, of which two were in natives of Barbadoes, admitted to the surgical wards of Colen Hospital during 1910 and 1911, and state that these are the only cases they can trace in the hospital clinical and autopsy records of 30,000 cases of malaria admitted during eight years. It might be mentioned here that negroes form the bulk of the population of the Canal Zone [13]. References are given by Noland and Watson to four other cases of spontaneous rupture of the spleen recounted in surgical literature, and during the discussion which followed the reading of their paper Clark reported one case which he had come across in the records of 3,217 autopsies at Ancon Hospital. Leighton and Moeller [14] describe a case which occurred in the 23rd General Hospital of the British Expeditionary Force in France, this patient had returned recently from India. Cases of spontaneous rupture of the spleen are also recorded by Ogilvie [15], Grey Turner [16], Rankine [17], Gossain [18], Skevington [19], Sheaf [20], and in the *Tropical Diseases Bulletin*, vol. ii, pp. 511-512, notes are given of two cases, one occurring in a European in Cochin China, and described as subcapsular, the other in a resident of Texas, who had just returned from the Philippines.

Many of the recorded cases of spontaneous rupture of the spleen are spontaneous in the sense that the rupture is not the result of external violence, but is brought about by muscular effort on the part of the victim, e.g., one of the cases recorded by Buchanan is that of a European who slipped upon his bathroom floor and doubtlessly the rupture was caused by his efforts to maintain his balance. It is conceivable that rupture of an enlarged and softened spleen might follow a paroxysm of coughing or straining at stool.

Macleod, quoted by Chevers [21], states that rupture is liable to occur in cases of (1) simple engorged spleen, (2) hypertrophied engorged spleen, (3) small hard spleen, (4) large hard spleen. From the description of the condition of the organ found on the post-mortem table, however, it would appear that the majority of spleens which rupture belong to the first two groups, and certainly all spleens which rupture spontaneously do. It is to be noted that kala-azar, once the disease is advanced, produces an enormously enlarged spleen of firm consistency with a thickened capsule and

trabeculae, so that at that stage it is unlikely to be a potent predisposing cause of rupture except in so far as owing to its increased size the spleen is more exposed to external injury. Yet in its early stage kala-azar may be the cause of rupture of the spleen, as has been pointed out by Laveran [22], who remarks that in acute kala-azar, when the spleen is soft, rupture may result from the coughing or crying of infants or from palpation or splenic puncture, he also mentions a case recorded by Machie of a girl of 17 suffering from kala-azar who died from spontaneous rupture of the spleen; nevertheless kala-azar is unlikely to be a cause of rupture of this viscus in West Africa where, although cutaneous leishmaniosis has been recorded [23] the existence of the disease based upon a case occurring at Freetown [24] is open to grave doubt [25].

The experience of medical men, whose practice has brought them into contact with the negro races of Africa, is the reverse of that of their confrères in the East so far as rupture of the spleen is concerned. A trivial blow inflicted upon a negro is not likely to involve the aggressor in legal proceedings on a charge of manslaughter resulting from rupture of the spleen. This is unquestionably due to the fact that adult negroes—in West Africa at all events—are not burdened with enlarged and softened spleens in spite of, or rather because of their having suffered severely from malaria in their childhood.

Daniels [26], whose experience with regard to negroes was largely gained in British Guiana, states that "diseases affect organs differently according to race," and exemplifies this by directing attention to the age incidence of splenic enlargement in the negro as compared with that of other races living in the same conditions; he shows that whilst in childhood all races are affected equally with malaria, in adult life the spleen of the negro tends to subside, whereas in other races similarly situated, Indians, Chinese and Aborigines, this organ remains in adult life increased in size, and on the post-mortem table will commonly be found to weigh three or four times as much as the normal organ of Europeans.

Scheube [27] considers it to be remarkable with what different frequency malarial cachexia is observed in the most malarious regions. "In India, more particularly in the Terai, Deccan and North Ceylon," he observes, "it is of frequent occurrence; in Africa, on the other hand, it is very rare." Neither F. Plehn in the Cameroons nor Koch in German East Africa, according to Scheube, ever encountered a typical case of malarial cachexia. The experience of the majority of medical men in West Africa will be found to coincide with that of these two observers, if by malarial cachexia in its typical form a condition of profound anæmia with enormous enlargement of the spleen, general œdema and physical and mental debility is implied.

It is commonly held with Kelsch and Kiener that complete immunity from malaria rarely if ever occurs; although Celli has described instances of natural immunity occurring in the Pontine Marshes,

and most authorities agree with Koch's dictum that the relative immunity of the dark-skinned African races is due to frequent infections with malaria in childhood. Again, it is frequently stated that the negro loses his tolerance of malarial parasites if he leaves his native district, and according to Ruge [28], Koch showed that tolerance as regards one type of malarial parasite acquired by frequent infections was in no way a protection against fever caused by another type of malarial parasite. Yet there appears to be no doubt that the negro is less susceptible to malarial infection than the majority of other races.

Thayer [29] states that evidence exists of a certain degree of immunity both natural and acquired against malaria, that one attack may not protect against subsequent attacks, but that there is reason to believe that severe and repeated attacks do in some instances result in an immunity of doubtful duration but more or less complete. After quoting Koch's theory with regard to the immunity of the African races, Thayer goes on to remark that it is undoubtedly true that in the United States the negroes who have inhabited that country for generations, living under conditions not differing essentially from those of their white neighbours, are much less liable to malarial infection than their white neighbours.

Laveran [30] considers that negroes are more resistant to attacks of malaria than whites when transplanted into a malarious district, stating that in the Mexican War negroes brought from the Sudan were extremely useful in "Las Tierras Calientes" because of the immunity from malaria which they enjoyed as compared with the Indians and the Creoles recruited from the Antilles.

Concerning the value of splenic enlargement as an indication of the prevalence of malaria, Daniels (*op. cit.*, p. 483) writes that a large proportion of negro children with enlarged spleens between the ages of 2 and 5 years is an indication of a high malarial endemicity; that, if the presence of malaria in a district be proved, the absence of enlarged spleens in adult negroes or a low splenic rate between the ages of 10 and 15 years equally proves a high malarial endemicity; but, on the other hand, if the proportion of enlarged spleens between the ages of 10 and 15 be large, or if the proportion of enlarged spleens in adult negroes be appreciable, the malarial endemicity is low. Daniels adds that such conclusions can be drawn with certainty as regards the negro race alone. The experience of this observer, which has been considerable and by no means confined to African races, leads him to believe that negroes react to infection with malaria in a manner differing from that of other races. In a series of post-mortem examinations made in Georgetown, British Guiana, Daniels found that the average weight of the spleen in negroes was 6.9 oz., in Indians 18.4 oz., and in Chinese 14.8 oz.; this is suggestive of some racial peculiarity since all those examined were subject to the same conditions as regards exposure to malarial infection,

and British Guiana, although he may have lived there now for many generations, is not the country of origin of the negro.

The spleen rate of the indigenous inhabitants of West Africa conforms with the constant type of spleen rate as described by Gill [31], so that absence of pernicious forms of malaria with a low malarial death-rate amongst adults is noticeable. Malaria, nevertheless, is commonly regarded as taking heavy toll of the negro in infancy and early childhood, the tolerance of later years is not acquired without risks. It is probable that it is only in childhood that symptoms of pernicious malaria are likely to exhibit themselves in the black races of Africa. It is during this same period of life that the negro is likeliest to suffer from rupture of the spleen, just as he is likeliest to manifest symptoms of blackwater fever whilst he is developing his tolerance of malarial parasites, whilst his spleen is showing enlargement which will disappear as this tolerance is gradually established.

Daniel's conclusions that enlargement of the spleen as an index of the malarial endemicity of a district is to be regarded as reliable as regards the negro alone is open to doubt when the investigations of Perry [32] are considered. Perry found that certain hill tracts in the Madras Presidency had been occupied by certain hill tribes from a very remote age, and that these tribes had been left in possession of the hill tracts because of the virulence of the malaria prevalent in those parts. He also found that immigrants to the hill tracts suffered more severely from malaria than the aborigines, and that whilst large-sized spleens were poorly represented in the aborigines after 16 years of age, an opposite condition prevailed amongst the immigrants. Perry further noted the low percentage of children amongst the aborigines harbouring "crescents" in proportion to the number showing parasites in their peripheral blood and the fact that the aborigines in the hill districts showed many more parasites in their peripheral circulation without symptoms than the immigrants, who suffered nevertheless more severely from malaria. There would appear to be a close resemblance in the reaction of the aborigines of the Jeypore hill districts and that of the indigenous inhabitants of West Africa to the malarial parasite. Enormously enlarged spleens, weighing from 8 to 20 lb., which are met with in India [33] and in the Caucasus [34] are not found at post-mortem examinations of natives of the Gold Coast, and some four years' experience of these examinations at Accra supports Daniels' contention that the average spleen of the negro in adult life does not exceed the normal for Europeans as given in Quain's "Anatomy."

Daniels elsewhere [35] gives statistics of 879 autopsies of East Indians resident in British Guiana, of 587 autopsies of negroes resident in British Guiana, and of 240 autopsies of negroes who were immigrants to British Guiana, the majority of the latter coming from Barbadoes or other West Indian islands where malaria, if it occurs, is not severe.

There were three cases of rupture of the spleen in the East Indians as the result of direct violence, there was no case in the negroes. Daniels points out that although in young adult negroes of the immigrant class, who, it may be presumed, had suffered recently from malaria, a decided excess of enlarged spleens was found, as compared with the findings in young adults of the resident class, yet this difference was not maintained in later life.

Whether such large spleens as are met with in the East as a result of malarial infection are caused by a different type of parasite or not is an interesting question. Rogers [36] states that splenic enlargement is more often found in infections caused by benign tertian or quartan parasites than in those caused by malignant tertian parasites. And Ruge (*op. cit.*, p. 61) remarks that enlargement of the spleen develops more rapidly in tertian and quartan malaria than in tropical malaria. Investigations into the treatment of malaria conducted during the recent war would seem to suggest that it is more difficult to eliminate the benign tertian parasite completely from the system than the malignant tertian parasite and apparently benign tertian infections are more prevalent in the East than they are in the tropical parts of Africa.

CONCLUSIONS.

(1) Rupture of the spleen, traumatic or spontaneous, as a sequela of malarial infection is rare in negroes resident in the tropics.

(2) When it occurs it will be found probably in children of the indigenous population or in children and in young adults who have migrated from districts where malaria is not endemic.

(3) Regression of the enlarged malarial spleen in adolescence and tolerance of malarial parasites are not peculiar to the negro race but may occur in any race which has been exposed for countless generations to continuous infection with malarial parasites.

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Atypical Amœba causing Dysenteric Lesions (G. C. Chatterjee, *Philippine Journal of Science*, October, 1920).—The author isolated an amœba causing fatal dysenteric lesions and differing from the classical pathogenic species in its nuclear and other characters from a large elevated inflammatory patch on the peritoneal surface of the wall of a portion of the intestine that was matted together. A smear was made from this patch on the peritoneal side, and was examined microscopically. It contained numerous actively motile amœbas. Smears of the pus, then lumen of the intestine, were found to be free from other micro-organisms. The amœba found differs from *Endamoeba histolytica* in the following points: The nucleus is massive—not karyosomic; there is marked distinction between ectoplasm and endoplasm; chromidia is absent. The lesions caused by this organism differ from those familiar in dysentery of *E. histolytica* origin, in that the small intestine is attacked—a phenomenon heretofore absolutely unknown in dysentery of endamoebic origin. Furthermore, the peculiar peritoneal involvement is unique. The author calls this amœba *E. paradysenteriae* sp. nov.

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THE JOURNAL OF Tropical Medicine and Hygiene

JUNE 15, 1921.

DR. CLAUDE H. MARSHALL'S NEW METHOD OF TREATMENT OF TRYPANOSOMIASIS.

SECOND NOTICE.

THE notice in the last issue of this Journal was merely an introduction to the important announcement made at a meeting of the Royal Society of

Tropical Medicine and Hygiene on May 20, 1921. This notice is composed of important extracts from the paper itself.

Attempts to cure patients infected with the trypanosome have, in the vast majority of cases, proved unsuccessful.

Most authorities are agreed that the administration of one dose of salvarsan, neo-salvarsan, or atoxyl is sufficient to sterilize the blood-stream, but within a variable period, averaging about four months, the symptoms reappear, and the disease progresses to a fatal termination.

Excluding reinfection, two theories have been put forward by other workers to account for this, namely: (1) that the trypanosome assumes a resistant form and becomes what is known as "atoxyl fast," or (2) that some of the parasites are protected from the action of the drug by assuming a secluded position in the central nervous system.

That the second of these theories is the right one is, I think, correct.

In four cases treated the blood and gland-juice were rendered free from parasites, presumably by the intravenous injection, but in both as early as three days, and as late as three and a half months afterwards, living trypanosomes were found in the cerebro-spinal fluid.

Vassallo has found, in performing post-mortem examinations on one or two fatal cases of sleeping sickness, that the meninges of the brain are greatly thickened, and we suggest that the action of the trypanosome in the central nervous system is to cause such thickening of the membranes that the connection between the blood-stream and the cerebro-spinal fluid through the choroid plexus is occluded quite early in the disease, and that, as a result, drugs circulating in the blood-stream are not eliminated into the spinal fluid, so that when the trypanosomes in the blood are killed off by natural or artificial means, the infection persists in the central nervous system, later on, may be, to re-infect the blood-stream again. On this point Professor Keith has very kindly furnished me with the benefit of his views, and he states: "While the exact anatomy of the route is unknown, there is no doubt that infections in the basal cisterns do reach the cervical glands, and that very probably this occurs through the nerve-sheaths, where there is some connection between the cerebro-spinal and the lymphatic systems." On this assumption, the trypanosome is protected by its position in the body and its suggested resistance to atoxyl and similar preparations is not proved, inasmuch as the trypanosome would not be brought into actual contact with the drug.

In the treatment of sleeping sickness, therefore, two separate foci of infection must be considered: the initial infection of the blood-stream, causing fever, skin rashes, &c., from which the patient recovers, either with or without treatment, and the second focus in the cerebro-spinal fluid, where the trypanosomes cause cerebro-spinal lesions leading to the death of the patient.

Before the cerebro-spinal fluid has been invaded, there appears to be no reason why injections of

arsenic and other preparations should not cure the patient; but once the invasion of the central nervous system has occurred, and drugs can no longer reach it from the blood-stream, all intravenous medication is useless, except to deal with such parasites as subsequently reappear in the blood-stream from the lymphatic system.

In the autumn of 1918, on the supposition that the above theory offered an explanation as to why all forms of treatment hitherto had proved so unsuccessful, I attempted intrathecal, in addition to intravenous medication.

My first case was a man with small typical glands (harboured trypanosomes) in the neck, who was injected with 0.6 gm. of neo-kharsivan intravenously on September 26, 1918. Three days later, 0.025 gm. of neo-kharsivan were injected into his spinal canal; he died the following day.

As this form of treatment failed it was not repeated, but the next case (a woman) was given an intravenous injection of neo-kharsivan, and three hours later 2 oz. of her blood were drawn off into a sterile-covered vessel, which was left standing in a bowl of cold water for twenty hours, by which time the clot had separated. Twenty minims of the clear serum were then injected into her spinal canal, after a corresponding amount of spinal fluid had been drawn off by lumbar puncture.

This woman was a well-marked case of sleeping sickness, trypanosomes being easily found in the large typical glands in the neck, and, though she has had no more treatment of any kind, and has been examined at intervals of three months, her blood has remained negative. When seen in December, 1920, twenty-seven months after treatment, she was quite well. Her blood and cerebro-spinal fluid were then negative, and the glands in the neck, which had completely disappeared soon after the injection, had not reappeared.

Thirteen other cases were treated in the same way. The amount of serum injected and the length of time between the injection of neo-kharsivan and the drawing off of the blood was varied. The results obtained up to the end of 1919 were published in the *British Medical Journal* of May 22, 1920.

Fifty-six cases are recorded, and fifty-two of these have been treated by some form of serum.

Of these fifty-two, six are dead or presumed dead; practically all the others were seen in December, 1920, and found to be perfectly well. In all cases the blood and cerebro-spinal fluid were examined, with negative results.

As a point of considerable interest, although all these cases originally had well-marked glands, yet after serum treatment these glands have invariably disappeared completely, while in cases not treated by serum the glands remain.

On the other hand, one case, the woman referred to, has remained quite well after twenty-seven months; another after twenty-four months, and seven more after over a year since being treated by a single dose of serum.

One patient treated in April, 1920, aged about 60, cycled in thirty miles one morning for re-

examination, a notable feat for him, since he stated that he had not been able to ride a bicycle for at least a year before treatment.

The question, then, arises whether this injection of salvarsanized serum into the spinal canal has given such good results from its antiseptic, or rather antiparasitic, action alone. It appears to us as improbable, if 0.6 gm. of neo-kharsivan are dissolved in all the blood in the body, and then 20 minims of this mixture are again diluted by the whole bulk of the cerebro-spinal fluid, that the resulting solution can be powerful enough to kill off the trypanosome.

We suggest that some trypanolytic antibody is normally formed in the blood as a reaction to the invasion by the parasite, and that this effects a natural cure as far as the blood-stream only is concerned. However, since in fact the cerebro-spinal fluid contains no antibodies, opsonins, or alexins, and as we suggest the cerebro-spinal fluid is cut off from the blood-stream by the disease, it follows that a natural cure cannot take in the central nervous system, but injection of blood serum containing the trypanolysin into the spinal canal is sufficient to kill the parasite, either directly or, as Dr. Abadie of Paris believes, by stimulating the formation of further antibodies.

To support this theory of trypanolysins we have in several cases given the patient no intravenous injection at all, but have simply drawn off a quantity of blood from a vein (under aseptic conditions) and allowed it to stand for as long as three days; we then injected the serum into the spinal canal, expecting that any contained trypanosomes would have died from exposure and the trypanolysins in the serum would effect the cure of the infection in the cerebro-spinal fluid, at the same time the parasites in the blood-stream would be destroyed by their own antibodies.

The first case so treated (No. 31, male, aged about 30) has now gone on well for six months up to December, 1920. No trypanosomes could then be found in his blood or spinal fluid; the glands in his neck had disappeared.

Following up this line of treatment, Vassallo is trying now the effect of the intraspinal injection of serum from a previously treated case into a patient with sleeping sickness. It is, however, yet too soon to form any opinion as to its effect.

Of more interest in this connection is the case of Mr. J. G. Rubie, our only European patient. He had attacks of what he believed to be malaria, commencing July 30, 1920, and, finally, had his blood examined on August 24, when it was found to be swarming with trypanosomes.

I first saw him as a patient on September 24, 1920. He had general lassitude, malaise, distaste for food, attacks of vomiting, with pains in the back and limbs, and a dull headache. He had lost two stone in weight. There was one small gland in the neck (which may possibly have been septic in origin), and his blood showed two or three trypanosomes in each field.

He was given 0.9 gm. of neo-kharsivan intravenously and 12 c.c. of serum into the spinal canal,

the blood being drawn off after half an hour. He showed a very severe reaction for several days and then made uninterrupted recovery. He has lost all symptoms, regained his lost weight, and will, I think, tell you that he feels absolutely well. It is a year since the probable date of infection, and nearly eight months since this single treatment which I have just detailed.

However, on November 2, 1920, about six weeks after the injection of serum, while nothing abnormal could be found in his blood, subinoculation on that day into two rats and a monkey resulted in one rat showing trypanosomes on November 30, while the other rat was negative. The monkey became very sick though it did not die, and no trypanosomes were found in its blood.

At this time, then, Mr. Rubie still harboured the parasite in his system, though apparently a strain of low virulence, since the monkey showed only a mild infection.

On December 21, 1920, the blood was examined again, both fresh and stained, by Professor J. Eyre, who reported one degenerate trypanosome without a nucleus, the only organism found in eight slides. Subinoculations into two guinea-pigs were negative. One of these guinea-pigs was post-mortemed about six weeks later, and was found absolutely healthy.

Then there arose the question as to what had occurred to account for this history, and three possibilities were considered:—

(1) An error in technique, that is to say, that the dose of neo-kharsivan had been too large or the time between the injection and the drawing off of the blood too short. Professor Eyre suggested that a provocative dose of 0.3 gm. of neo-kharsivan, and a period of one and a half hours before drawing off the blood, would establish the most favourable conditions for the production of trypanolysins, and

(2) That treatment had been commenced too early in the disease, and the body had not had time to react and produce antibodies to the trypanosome, with the result that the serum was valueless. If this were the case, it would, I imagine, be incompatible with the experience of most of us that late rather than early treatment in a progressive disease could be to the patient's advantage, and

(3) That the presence of degenerating trypanosomes in the body after treatment was merely a feature of the normal process of the cure by this method. We accept this as the explanation.

On January 20, 1921, lumbar puncture was performed and the cerebro-spinal fluid was examined, both fresh and stained, also 1 c.c. each was subinoculated into two rats; all results proved negative and the cerebro-spinal fluid contained no cells of any kind.

The patient was examined again on April 7, 1921, and his blood found to be negative on examination of fresh and stained slides and subinoculation into two rats and six mice. On May 2 his cerebro-spinal fluid was normal and negative on subinoculation into three rats and two mice.

That Rubie's presumed cure is not due to the initial dose of neo-kharsivan killing off all the try-

panosomes in the body is certain, since the sub-inoculation on November 2 showed that he still harboured the parasite; that treatment was effective, both in technique and time, is shown by his excellent clinical history and the completely negative results of microscopical examination and of further subinoculations since the beginning of this year. We believe that the explanation of his history is that the injection into the spinal canal dealt with that focus of infection while the continued formation of trypanolysins in the blood gradually destroyed the parasites in the bloodstream.

Our two most advanced cases of sleeping sickness did not prove amenable to treatment, and we are proposing to treat such cases in the future by the injection of serum into the lateral ventricles as well as into the spinal canal, on the supposition that something of the nature of an obstructive hydrocephalus occurs in these patients, through the occlusion of the foramen of Majendie by thickening of the membranes, and that, as a result, intrathecal injections are unable to reach the cavity of the brain. This idea is supported by the fact that often, in advanced cases, no cerebro-spinal fluid at all can be obtained by the lumbar puncture.

We intend, however, to investigate this point by injection of indigo-carmin into the lateral ventricle and endeavouring to recover it by lumbar puncture. Inability to do so would prove the correctness of this theory, and indicate that these cases require serum to be injected directly into the brain cavity.

To sum up, as far as our experiments have gone, they show (1) that there are two distinct foci of infection in an established case of sleeping sickness, and that of these the focus in the central nervous system is the important one, but that this can be dealt with effectively by a single dose of some sort of serum; (2) that the results of such serum treatment in over fifty cases appear to be better than any of the results hitherto obtained by repeated intravenous or subcutaneous injection of salvarsan, atoxyl, antimony or other preparations; and we suggest that the curative effect results from the formation and action of some form of trypanolysin.

If our theories are correct, there appears no reason why animal serum should not be used for treatment, why some degree of prophylaxis and immunity to trypanosomiasis should not be obtained, and why early diagnosis should not be effected by some form of complement fixation test. Upon all these questions Vassallo is carrying out experiments.

Further, the line of treatment adopted for human beings can probably be applied to animals. The cure of "fly" disease in horses and cattle should prove of great economic value, and, given time and opportunity, both Vassallo and I have great hopes of being able to deal simply and effectively with trypanosome diseases both in man and beast. But we are very anxious that we should be assisted by the veterinary branch of medical science in these researches. The problem of trypanosome infection is the same whether applied to human beings or

other animals, and experiments on the treatment of each dovetail into one another, so that the co-operation of a veterinary officer in future work is extremely desirable.

RUPTURED SPLEEN.

AT page 164 of this issue of the Journal will be found an excellent article on "Spontaneous Rupture of the Spleen" by Dr. A. Ingram. He reviews the literature of rupture of the spleen in general, and gives a very comprehensive article upon an important subject. He refers also to an article of mine written as long ago as 1908, and published in this Journal on July 1 of that year. My contribution to this subject was in reference to the medico-legal relations of splenic rupture, whilst giving evidence in court in Hong-Kong in the case of a trial for murder by a man who was said to have hit another over the spleen, with the result that the spleen was ruptured and death occurred from hæmorrhage. Post mortem it was found that the man had a rupture of the spleen in its inner aspect—not its outer, as might be expected, seeing that death occurs from violence, either a kick or a blow. This occasioned a very fine medico-legal question. Can a blow over an enlarged spleen cause rupture of the inner aspect of the organ? If it can, then the man who inflicted the blow is guilty of manslaughter in such a case. Or during the excitement of the quarrel, did the turgid spleen rupture "spontaneously"? In at least two of the seven cases of ruptured spleen I reported between the years 1888 and 1896 the spleen was ruptured on its inner surface, but I cannot remember seeing a statement as to which surface of the spleen until I read Dr. Ingram's article that the rupture was on the inner aspect of the spleen, where "there was a longitudinal rent running parallel with and immediately posterior to the hilum." This is the exact position of the rent in the cases I had reported in 1908.

The whole question from the medico-legal point of view is: Can a blow on the outer surface rupture the spleen in its inner aspect? A clever lawyer could persuade a "favouring" jury that this was impossible from a blow or kick, and that the prisoner cannot be held guilty of hastening the man's death. A blow, he would argue, must show bruising, &c., on the outer side before the inner surface could (if it ever could) be ruptured. On this being believed the prisoner would get off.

That the inner aspect of the spleen should have a more delicate capsule than the outer would be expected theoretically, for on the inner side the spleen rests on the stomach, and there is little or no friction as the spleen moves with the stomach; whereas on the outer side the spleen rubs against the diaphragm with every breath taken, and in time the capsule on the outer side would naturally be the thicker. This may be theoretically correct, but I have not found any such statement to that effect in the text-books. Although daily engaged in the dissecting room for nineteen years, I have not myself dealt with this matter. It is time the matter was cleared up.

JAMES CANTLIE.

Abstracts and Reprints.

PROTOZOOLOGIC AND CLINICAL STUDIES ON THE TREATMENT OF PROTOZOAL DYSENTERY WITH BENZYL BENZOATE.¹

By FRANK G. HAUGHWOUT and ELIAS DOMINGO.

IN the first paper of this series the senior author, in collaboration with Doctors Lantin and Asuzano, reported on the treatment of eight cases of acute entamoebiasis with benzyl benzoate. The results obtained in that series were so encouraging that it was determined to extend the experiments to affections produced by other intestinal protozoa. Subsequent experiments on cases of entamoebiasis have confirmed our earlier observations, but the treatment of flagellate infections has been, as was our expectation, much less encouraging. The case about to be reported is the first infection with *Balantidium coli* that has fallen under our control since the experiments were started: and, although we report a single case with some hesitation, still the circumstances under which the case was studied were, in some respects, so favourable, and the results we obtained so good, that we feel justified in making the report in order that other investigators may take up the work as opportunity comes to them. Moreover, it must be recalled that the clinical treatment of balantidiosis has always been more or less unsatisfactory.

When we first undertook the study of the material obtained at the necropsy of our case, the findings seemed relatively simple. But, as we continue the study of our sections and toto mounts, interesting problems present themselves and emphasize the necessity of a more thorough study of the material. Therefore, we have decided to report the autopsy findings very briefly in this paper and reserve the details for a paper to be published later, by which time we shall have, in addition to the material from this case, more material from other sources for comparison.

The salient features presented by the case now under consideration are as follows:

The patient developed dysentery late in December of last year. The stools were dysenteric in character and contained swarms of *B. coli*. Local treatment was given by proctoclysis; but on January 10, when the case was first referred to the senior author, the patient had lost greatly in strength and appeared to be approaching death. On January 13, when treatment with benzyl benzoate was started, the patient was practically in extremis. The bowels were in almost constant motion, and he was apparently in great pain and distress. It seemed unlikely that any treatment would be successful.

However, four days after the treatment was started, all other forms of treatment having in the meantime been discontinued, the pain and tenesmus had entirely disappeared and the patient was passing formed, feculent stools; his appetite had shown distinct improvement, and he was able to sleep quietly. The

treatment was continued for twenty-four days, the balantidia showing a general tendency to disappear and finally appearing in the stool for the last time on January 29, nineteen days before the death of the patient from causes unrelated to the dysentery.

During the course of the benzyl benzoate treatment the patient showed a slow but constant improvement as regarded his general condition. The dysenteric symptoms never recurred, and his stools, though occasionally soft, were always feculent. About February 12, however, he became sick again with symptoms indicating trouble in the respiratory tract. He rapidly grew worse, and died on February 17. His stool was examined for the last time the previous day. It was hard and feculent and contained no balantidia. The patient had received no benzyl benzoate since February 6.

Autopsy was performed one hour after death, the body being still warm. Scrapings were taken from points along the intestinal tract and search made in them for *Balantidium*. None was found. The site of the dysenteric process was found in the region of the splenic flexure. The ulcerative process had healed. This area was cut out with some of the neighbouring gut, divided between the two operators (W. de L. and F. G. H.), and immediately placed in a fixing solution. Subsequently it was all cut into many small blocks and embedded in paraffin. Several sections were cut from each block and stained. Study of these gave ample evidence of the former presence of the parasites, but we utterly failed to find the parasites themselves. This is in such marked contradistinction to the findings in the intestines of persons who have died of balantidial dysentery, that we are inclined to suspect that our patient had lost his balantidial infection some time before death.

Medical News.

Presentation to Dr. F. B. Power, late Director Wellcome Chemical Research Laboratories, London.—An interesting Anglo-American function took place in the Assembly Hall of the Cosmos Club, Washington, U.S.A., on May 9, when Mr. Henry S. Wellcome, well known for his generous promotion of scientific research, presented Dr. F. B. Power with a gold medal specially struck to commemorate Dr. Power's distinguished services to science during eighteen and a half years as Director of the Wellcome Chemical Research Laboratories, London. Dr. Power's researches have been chiefly concerned with the constituents of plants, and more especially those plants used in medicine. During his directorship of the Wellcome Laboratories about 170 papers were contributed to scientific societies, and, as one of the speakers at the presentation said, Dr. Power had during that time the greatest influence both in America and Great Britain in raising the standard of our pharmacopœias.

¹ Abstracted from the *Philippine Journal of Science*, vol. xvi, No. 6, June, 1920.

Original Communications.

UNDULANT FEVER.

By Sir PERCY W. BASSETT-SMITH, R.N. (ret'd.), K.C.B., C.M.G.,
F.R.C.S., F.R.C.P.

To-day my subject is Malta, Mediterranean or undulant fever, a disease in which I have been particularly interested for over twenty years both from a clinical and laboratory point of view. Its course may vary from three weeks to two years or more, so the patients naturally claim a good deal of attention. Though primarily its baneful influence was most felt by naval and military forces yet, as will be shown, the civil population in the endemic areas are also heavily infected.

Historically it was first recognized by Marston during the Crimean War and it was isolated from enteric; for a long time its differentiation was uncertain. In 1886 Bruce isolated the infecting organism, which was called *M. melitensis*, as the disease was believed to be more or less limited to Malta Island. I would here urge that these geographical names be dropped, and the term undulant fever, used by Hughes in his valuable monograph, should be more recognized for, as now known, its distribution is world wide. Undoubtedly one of the most important endemic centres is Malta, for there the source of infection was abundant and the presence of a continuous stream of non-immune men was provided by the changing naval and military forces, and the hospitals were hotbeds of the disease. No wonder, therefore, that as a nation we were interested in the discovery of the cause and methods of preventing a fever which annually gave rise to such a high amount of invaliding from the station, and so many days' sickness in the fighting forces. We now know that the fever is widely spread all round the Mediterranean littoral in Spain, France, Italy, Greece, the Levant, Egypt, Tripoli, Tunis, Algiers, and is present in most of the islands, Sicily, Cyprus, Candia, Sardinia, Corsica, &c. During the past few years its extension to districts far from the seas has been shown in Spain, Portugal and France.

This extension inland is a most important epidemiological factor. If we leave the Mediterranean, endemic centres are found at Suakin and Aden, and in India it has long been recognized in the Punjab. In China I have seen cases in the Yang Tse Valley, near Shanghai, and Craig reported it from the Philippines. In tropical Africa it is present in the Soudan, by the Blue Nile, in Northern Nigeria, and in Uganda. After the Boer War the disease became very prevalent in South Africa, the Transvaal and Orange River Colony, that is when the cattle were few and more goats' milk was used. In America there appears to be a true endemic centre in Texas extending into New Mexico, and lately the disease has been described from Peru, so you see the term Malta or Mediterranean fever is greatly misleading.

Symptomatology.—After an incubation period of about a fortnight the fever generally develops but very long periods are often mentioned. This is due to the fact that the infection may lie latent and the onset occur when from some cause or another the resisting power breaks down, due to chill, over exertion, &c., in this way cases are noted which appear a long time after leaving the endemic area, and it was common for men who had passed through Malta to get the onset on another station, and often a man had run through his whole time in the Mediterranean free from fever to develop it on returning to England. I well remember one case of my own who had served three years in the Mediterranean in good health; he left Gibraltar in December and the onset of symptoms occurred in England two months later, the first pyrexial period being one of great intensity. In laboratory infections it is generally short, in my own case six days. As stated before, the disease may last from two weeks to two years and the course and symptoms are very varied. It has many of the general and local symptoms of a septicæmia, which differ from a high remittent type of fever with sometimes a fatal termination (about 2 per cent. in man, 6 per cent. in children) to a chronic hectic pyrexia. Much depends on the amount and virulence of the toxin present. The chief and most constant clinical manifestation is pyrexia, but ambulant types of the disease without symptoms occur in which the person is passing out the infecting organism in his urine. These are all potential "carriers." Besides these ambulant types three others may be recognized, but there is no hard and fast line between them. *Mild fevers*, the fever lasting about fourteen days and often not correctly diagnosed. *Severe fevers* with high remittent or continued temperature in which a typhoid-like condition is produced and delirium is marked. Secondary pneumonia develops and death occurs from hyperpyrexia, heart failure or lung engorgement. In the most common form there are marked waves of remittent fever of variable length and intensity separated from one another by periods of temporary absence of symptoms; the onset is usually gradual, the fever rises to 103° F. or 104° F., epistaxis, headache, enlarged spleen, coated tongue, constipation and sweats are marked and sleeplessness is common, each wave lasts about a fortnight and these typically get shorter and less marked at each recurrence, but after each wave, depression, with loss of flesh increases and the sweats are more marked, with occurrence of neuritis, swollen and painful joints and rarely orchitis. As the patient becomes more and more emaciated and prostrate, he is subject to bronchitis, cardiac palpitations, and increased rheumatic-like pains, the hair falls out or turns grey and the patient ages remarkably, the duration is about four months but complete convalescence is very slow. Constipation is characteristic throughout. Lastly, there is an intermittent type in which the fever is of a hectic type, these with coughs, sweats and general wasting led to the term Mediterranean

phthisis. This intermittent type of fever often follows the long relapsing type and may last for months, it appears to be common in South Africa. Strachan states how difficult these cases are to diagnose, and if the temperature is only taken in the morning they are often entirely missed.

It is impossible here to describe more fully all the characters, but I would like to refer to the influence the disease has on the nervous system. We know that the micro-organism is widely distributed in the body, it has been recovered from the blood, lymphatic glands, organs, joints, nerves and gall-bladder, and that it can give rise to an infective endocarditis. Besides the symptoms of general infection produced by the organism it, with its endotoxin, may cause local changes, cold abscesses, costal swellings where there is a necrosis of tissue without true formation of pus but containing the micrococcus. In other cases the toxin produces irritation symptoms of the meninges and central nervous system, having a special selective action for the peripheral nerves. In chronic cases the evidence of toxic infection is found in the organs evidenced by hypertrophic fibrosis in the liver and spleen, with often a small cell infiltration. R. de Nunno has shown that the toxin of dead cultures produces similar effects to those of living cultures, causing degeneration of the nerve cells with breaking up of the nerve fibrils and a leucocytic infiltration in the cerebrum, medulla and cord, the peripheral nerves also being severely affected. He considers that the histological changes explain why neuritis is so common. Clinically the influence of the toxin is shown by the marked insomnia and despondency, by the headache, backache, shifting pains in the limbs in the early stages, and later by the repeated attacks of neuralgia. Sometimes there is partial paralysis of groups of muscles which is not permanent, and I have had one case with secondary neuritis going on to complete paraplegia. The pains often alternate in intensity with the amount of pyrexia, where the pains are severe the patient may be completely helpless, and intense hyperæsthesia of the feet may increase the discomfort. The reflexes are generally increased except in very chronic cases. Sleeplessness is most troublesome, and in severe cases low muttering delirium is present followed perhaps by loss of memory. I have lately had a case in which during the third month there was acute herpes affecting the fourth and fifth lumbar nerve ganglia of the right side. Many of the cardiac symptoms, shown by marked tachycardia, bradycardia and palpitation, are referable to the action of the toxin on the nervous system. In some cases there may be very few subjective or objective signs beyond pyrexia and loss of weight. Cristina and Maggiore state that in young children the nervous system appears to be particularly affected by the toxin which causes meningitis, encephalitis, or even bulbar signs. In the meningitis there is much leucocytic proliferation, the meningo-encephalitis shows a preference for the Rolandic area and causes

convulsions and spastic paralysis, &c. In acute cases I have seen the facial neuralgia so severe that morphia injections alone relieved it; in chronic cases the crippling effects of the neuritis, like those of sciatica, are very troublesome.

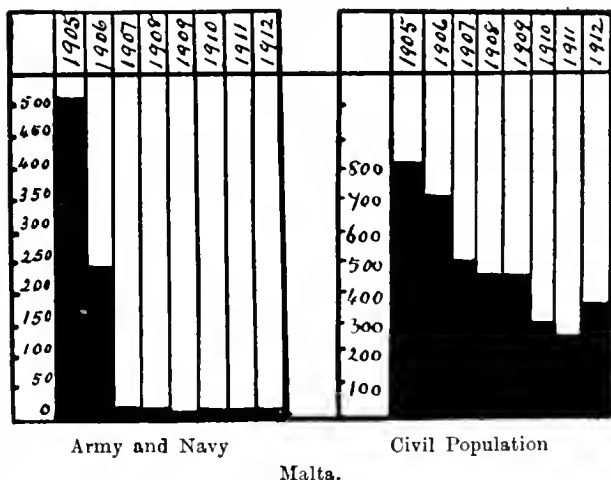
Etiology.—The infecting organism, generally described as the *M. melitensis*, is very minute, and though frequently spherical is often coccoid or like a cocco-bacillus, in fact one American author, Hess, calls it a bacillus, and lately Mayer and Shaw have grouped it with *B. abortus* found in cattle, this relationship is of very great importance, particularly with regard to milk agglutination tests for diagnosis. Kennedy in examination of a number of samples of cows' milk in England obtained positive reactions in many with the *M. melitensis*. I also carried out similar tests at Greenwich, and though positive reactions were found in fourteen out of forty-eight samples when tested in low dilutions, these were generally cut out by heating the milk to 63° C. for half an hour, as recommended for serum by Nicolle. I did not look upon them as specific; however, it is a subject which requires further examination.

Epidemiology.—The disease is mostly subtropical in distribution; wherever it occurs endemically goats in herds are practically always present, and although the Maltese goat, which has been widely exported on account of its great milking value, is the most frequent offender, yet any goats are susceptible to infection, and from these it may spread to other animals, as cows, mules, horses, dogs, &c. A very interesting account is given of the irregular distribution of infection by Léger. When the goats are brought down from the hills in Corsica the women who milk them become infected through the hands, by the organisms present in the milk, which milk is to be converted into cheese; they themselves rarely or never drink the milk. One infected goat may infect healthy herds when introduced among them, and these may infect the dogs and goatmen. In Spain and France the same thing occurs. Though direct ingestion of infected milk is undoubtedly the most common source of infection, the products of milk are also very dangerous in the endemic area. Thus recently it has frequently been traced to fresh native-made cheese, and I had a Greek officer who suffered from a most severe attack in whom the source of infection was undoubtedly ice cream taken in Algeria.

The infecting organism may be, however, directly inoculated through the skin, and Séjournant goes as far as to say that though in towns the usual source of infection is by drinking infected milk, in rural districts it is mostly caused by direct infection or inoculation of infected soil in milk or otherwise. The fact that the infecting organism is passed out by the urine and the faeces should make us treat all cases as potentially infective and having the excreta, &c., disinfected, warning the nurses accordingly. In 1900 when I went to Haslar Hospital in charge of the tropical cases and the laboratory, we always had for years two large wards

full of the disease; it is impossible to forget the feeling of helplessness, seeing these cases in every stage, relapsing time after time, and not to know

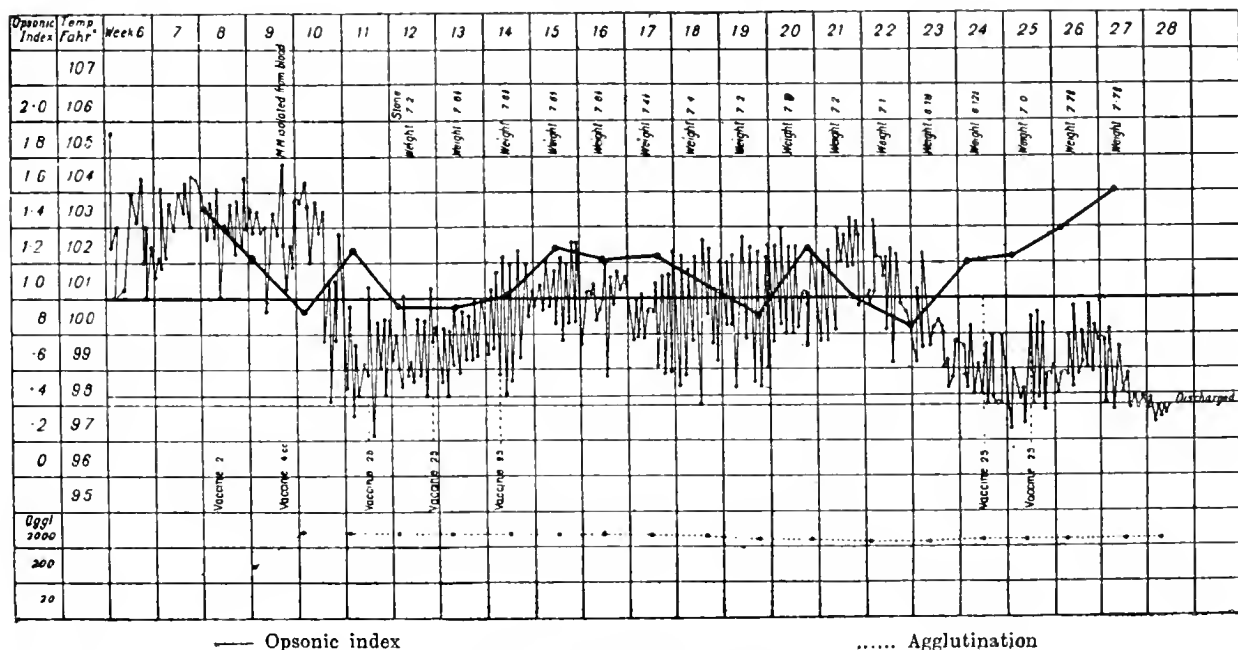
INCIDENCE CHART.



how to prevent this. In 1901 Lord Selborne instructed a small committee to investigate the cause, for which I worked at home. We attempted to determine the viability of the organism, how it got out of the body, and if possible how it made its entrance. We fairly quickly proved that the organism was very virulent and easily acquired by accidental inoculation. We found that it was far more resistant outside the body than was generally believed, living for weeks in sterile sea and tap water, in urine, dust, and clothing, and that though it grew abundantly in milk there was no external

change noticeable. It was easily killed by heat and disinfectant and direct sunlight, but withstood cold, 32°20 for fourteen days. In one case I found it excreted in the urine, and though not recovered by direct cultures of blood on to agar, it could be obtained from the peripheral blood when planted in broth, seven out of the eighteen cases. From these facts I believed and reported that infection was spread by urine and excreta scattered in the dust by wind, and that personal infection was through the throat or by milk and food thus infected. I failed to recommend the complete sterilization of all milk, and had at that time no knowledge of the true source of infection. In 1906 the final report of the Royal Society's Commission under Sir David Bruce, which had been working at Malta for two years, proved that the usual source of infection was through the native goats, who themselves appear to be perfectly healthy; from these findings, leading to the compulsory sterilization of all milk for use in the service, the disease has been practically abolished and an enormous saving of money, time and distress brought about. No modern scientific work has been more successful or of greater use to humanity.

In 1904 there were 430 cases in the Navy with 28,458 days sickness and 9 deaths. In 1907 this was reduced to 12 cases, but in the civil population it still remained at a high rate (457). During my early time at Haslar, Wright was working at Netley, and for his courtesy and help I owe him a deep debt of gratitude, for besides carrying out the work already noted, the agglutinating and bactericidal properties of the blood and cellular changes were studied. Neither in healthy nor in infected men was there any marked bactericidal resistance to the micrococcus, but the agglutinins were more inter-



Long case of severe undulant fever.

esting; they appear on the fifth day and were generally found in early cases at a very high titre. With regard to agglutinins the following points came out. High sustained agglutination was of good augury. Continued low agglutination with marked fever and cachexia were bad. A rapid fall was often the sign of an approaching relapse. A rise with improved clinical signs was good. In very chronic cases the agglutination was often very low, in one case of eighteen months' duration it was only 1/10 when at the same time I isolated the organism from the spleen. The agglutination curve did not show any relation to the fever curve. Histologically, the lowest red cell count was 2,800,000; the white cells always showed a marked lymphocytosis, 40-70 per cent. To determine the specificity of the agglutination reaction, 150 cases with other disease were tested in the general wards and in only four were positive results obtained; these on inquiry gave a history of being in Malta Hospital recently and were probably really infected. In five years 552 cases were treated with 52 invalidings and 2 deaths, the average duration of the disease being four months. During the last year of prevalence of the disease at Haslar, when the disease was rampant 61 cases were treated with stock melitensis vaccine made from recently isolated organisms; in all 224 injections were given and the results carefully controlled by opsonic index readings. I found that in many cases there was a short slight negative phase followed by a longer and sustained high positive one. In no case at the site of the inoculation were there any abscess formations, and the constitutional disturbance in properly selected cases was slight. The general conclusions arrived at are that in acute cases with much auto-infection little or no good was derived from vaccine therapy, but in more chronic forms with irregular or slight temperature there was a distinct benefit. In some vaccines given on a rising wave this was cut short and permanently kept down. Since these investigations were made I have generally used vaccine and often with good effect, substituting a sensitized for the ordinary vaccine; but I still think that with very high temperature the vaccine should not be given. At the commencement of the war I especially brought to notice the importance of maintaining the milk precautions which had been so successful and recognized the great danger. The aggregation of so many men who would be of different nationalities and habits in small areas under conditions of trench warfare, where sanitary measures would be of extreme difficulty to carry out and where flies abound, associated with a high temperature, would in the presence of lowered resistance from fatigue of the men, very greatly favour the development of the fever. Happily the fear was not realized, for there have only been thirty-one cases in the Navy during the four years. The older officers who had witnessed the terrible results in the early part of the century were mostly replaced by new ones who had not had this experience.

For diagnosis, laboratory methods have always to be employed. The most certain is the isolation of the micrococcus from the blood; I prefer to do this in the afternoon during a pyrexial wave; 10 c.c. of blood should be drawn off, divided into broth tubes and subcultured every day; a successful culture appears as minute dew-like colonies in seventy-two hours; or the following method may be used: take 1 c.c. of blood, allow to clot, remove serum with bactericidal substance and substitute broth, on two or three consecutive days; by this means successful cultures have been made when others failed.

(2) Isolation from the urine and faeces.

(3) By agglutination methods. This at one time was held in very bad repute owing mostly to faulty technique and faulty cultures. Nicolle has shown that different cultures vary greatly in agglutinable characters, and some auto-agglutinate very readily, also that serum may be deprived of non-specific agglutinins by heating to 57° C. for half an hour; lastly, that the serum should be separated as soon as possible from the clot. My procedure is: (1) Divide serum into two parts—one of these to be heated to 57° C. (2) Each serum should be put up in dilutions of 1/40, 1/100 and 1/400 with a test emulsion, by the macroscopic method, a control of known positive and negative serum being used. (3) The emulsion must be from a well-tested strain grown on agar of not more than forty-eight hours' growth (living or dead). (4) The tubes should be placed in the hot incubator for two hours, then left at room temperature all night, then read off. I prefer this to the use of Garrow's agglutinator, but with thick emulsion this will give good results. I have used complemental fixation with satisfactory results, and this is especially valuable when agglutination has given contradictory results or for clinical reasons further confirmation is required.

NOTE ON A SIMPLE APPARATUS FOR TAKING BLOOD-CULTURE, GIVING SUBCUTANEOUS OR INTRAVENOUS INJECTION, AND COLLECTING ANTI-TOXIN.

By J. GRAHAM WILLMORE, M.R.C.S., L.R.C.P.

Senior Medical Officer, Tropical Section, Ministry of Pensions Hospital, Orpington.

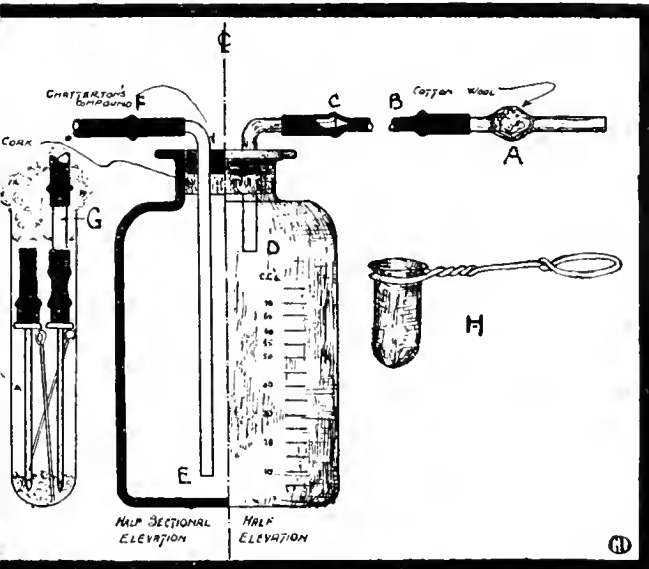
For many years the writer was constantly faced with the necessity of taking blood-cultures, or giving injections of antitoxin or saline solutions, in the desert where the usual apparatus were often not to be obtained, and when contamination from dust and sand storms was especially troublesome. The apparatus which forms the subject of this note was found to fulfil the desiderate required, in that it consists of materials which can be obtained and transported anywhere, put together in any field laboratory, and is so designed that at no time during its manipulation does the blood, the culture medium or the fluid to be injected come into contact with unfiltered air.

As shown in the accompanying illustration, the apparatus consists of a container, which may be any bottle with a mouth large enough to take two pieces of glass tubing—even pickle bottles, jam jars, or potted-meat bottles have served. A piece of cork is cut roughly to fit the inside of the neck, and two holes are bored in it with a hot skewer or nail to take the glass tubes.

The outside of the container may be graduated in five (5) or ten (10) c.c.'s by adding these amounts from a measure and scratching on the glass.

Four pieces of glass tubing are then cut, the first about 4 in. long, which is flanged at one end and has a small bulb (A) blown in it. The bulb is stuffed with cotton wool.

The lengths of the next two pieces (E and D) depend upon the size and shape of the container; they are each flanged at the short end, bent at right-angles, and inserted through the cork as shown in



the figure. The fourth piece (G) is straight and about 2 in. long; both ends are flanged.

When cool, the ends B and C and of E and G are connected with rubber tubing of convenient lengths, that connecting F and G being much the longer.

The lower end of G is connected with a serum needle—preferably of platinum-iridium—by a very short piece of rubber tubing so that the needle almost touches the glass. The joints may be reinforced with ligatures. The needle attached to the tubing is then placed, with stylets and a spare needle, in a test-tube which is plugged with cotton wool. If necessary, the plug can be sealed with paraffin or other wax after sterilization.

If the apparatus is to be used for blood-culture work, the required amount of medium—broth, bile or taurocholate solution—is introduced into the container, the apparatus fitted together as shown, and the mouth of the bottle above the cork filled with

Chatterton's composition. This is a composition containing some kind of pitch, and can be obtained from any motor transport depot; it is used for waterproofing batteries.

At a pinch, a piece of stout paper may replace the cork, as all that is required is a scaffold to retain the composition in place, and prevent it from running into the container during sterilization. The whole apparatus is then autoclaved; if it be wanted for the collection or injection of serum it is, of course, autoclaved empty.

When it has cooled and the pitch is beginning to set, the long bent tube is adjusted to the desired height. The rubber tubes are folded on themselves and ligatured with tape, tied in a bow, and in about twenty-four hours the composition sets to a firm mass. The apparatus can now be stored for an indefinite period without the contents evaporating or being contaminated; or transported any distance in any position, or shaken, without the contents spilling.

To take a blood-culture, the tubes are untied, the needle removed from the test-tube and introduced into a vein; the bottle is held below the level of the vein and the necessary amount of blood is run in—aided by suction at A if necessary. When this has occurred, the long rubber tube is pinched with the fingers or a spring clip (previously adjusted), the needle is removed from the vein, flamed and sealed by running in a little paraffin wax which has been sterilized by heat. (A convenient form of container for this can be improvised from a small test-tube and a piece of wire, as shown (H), and sent out with the apparatus.)

The rubber tubes are then retied, the apparatus sent to the laboratory and incubated; if anaerobic cultures are desired, a glucose medium may be used, with a layer of liquid paraffin on top, or if preferred A can be attached to a vacuum pump and hydrogen passed through the medium from G.

For examination, the needle is unsealed by flaming and the necessary amount of medium blown out on to plates (or into any special medium), the process being repeated as often as desired without exposing the blood-culture medium to any possibility of contamination.

Further, the long bent tube can be raised or lowered so as to examine fluid from any particular layer, as the composition is easily softened by warming it.

For use in a place where ordinary laboratory apparatus are obtainable, the container may be a flask or long narrow graduated cylinder, fitted with a perforated rubber cork. The principle remains the same.

When used for collecting antitoxin, the needle attached to G is replaced by a long glass tube; the horse having been bled into sterilized cylinders covered with two layers of paper, the glass tube is plunged into the serum through a head of pure carbolic on the underneath paper. The serum is run into the container by syphonage, started by suction at A, and the glass rod is later replaced

by the needle. Subsequent proceedings are as described above. The serum is allowed to settle, blown out to be tested for sterility, antitoxic power, &c., and is finally either injected directly into patients or blown out into ampoules. These latter operations are effected by attaching a spring clip to the long rubber tubing, and a Politzer bag to A. Positive pressure is induced in the container, and the clip is released momentarily until all the air is expelled from the tubing from E to needle. The needle is then introduced into vein or tissues and the clip released. When the necessary amount has been injected, the clip is closed, and the needle withdrawn. Any drops of serum remaining are shaken out, the needle thoroughly flamed, and injection of the next patient can proceed at once.

One assistant only is necessary, and from personal experience on a very large scale from 1909 to 1914 the writer can testify not only to the enormous saving of time and labour which this apparatus entailed, but also to the fact that its use was unattended by sepsis in a single instance, or by the contamination of a single batch of serum.

Tertiary Manifestations of Yaws in the Region of Tanganik Moero (R. Van Nitsen, *Annales de la Société Belge de Médecine Tropical*, No. 1, November, 1920).—The author gives a most interesting account of various forms of tertiary yaws observed by him. He divides these into four groups: Skin lesions, mucous lesions, articular lesions, bone lesions. Each group includes various manifestations of the disease. The author considers that there can be no doubt as to these being forms of tertiary yaws—the existence of which is insisted upon by Castellani—for the following reasons: They are only met with in persons having had secondary yaws. Their geographical distribution corresponds exactly with that of yaws.

In the course of a secondary yaws eruption it is not rare to witness the transformation of the granuloma into an ulcer; these lesions appear to confer a definite immunity against yaws; natives who show these manifestations of tertiary yaws have no further attacks of the disease, although living in a region where yaws is endemic.

The author lays stress on the fact that in this region (Tanganik Moero) syphilis is little met with, in many parts is even quite unknown. In 459 examinations not one patient presented any sign of syphilis—neither primary nor secondary lesions, nor hereditary manifestations of any kind. Leprosy is rare in these parts, and tuberculosis practically unknown. The natives, who are very observant, distinguish quite well between diseases such as leprosy, yaws, &c., and have names in their dialects for the various manifestations of yaws.

The author gives a detailed account of many of his cases, accompanied by some excellent photographs.

Notices.

BUSINESS AND GENERAL.

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THE JOURNAL OF Tropical Medicine and Hygiene

JULY 1, 1921.

MONGALLA.

In an isolated district of the Sudan, some thousand miles south of Khartoum, and butting in between Uganda and the French Congo, lies the district of Mongalla. The province is some 300 miles long by 200 odd miles across, wooded for

the most part and richly watered. It lies some four degrees north of the equator. In the older maps—that is, those of some twenty years ago, the name is not to be found, and even now is but little known. It is, however, a British outpost, and protected by a contingent of native soldiers under a few British officers. Fashoda, rendered so famous a few years ago by a French officer and his following having arrived and hoisted the French flag, lies to the north. The French intended to straddle Africa by this move, and by reaching the Abyssinian border prevent the British extending southwards from the Sudan to British territories to the south and so block the route from the Cape to Cairo. What happened diplomats and Foreign Office officials alone can divulge, but managed it was, and the French officer had to retire, and the French idea of conquest in this direction was thwarted. Then the district had a political importance, but now it has for tropical medicine and the spread of disease a position of great interest for here the valleys of the Nile and of the Congo approximate, each afflicted with diseases more or less characteristic. Here in Mongalla eastern and western areas of Africa meet and communicate their ailments to the natives, and the great scourge of Africa—the tsetse fly—is present in force.

In Mongalla there are no roads, for there are no vehicles to traverse them, as the tsetse has rendered horse life impossible; there being no roads, only forest tracks, hence the cycle even in any form is but of very limited use for a journey of any length. No railways exist, and there are no means of communication except by local runners anywhere in or around Mongalla, yet we find the diseases of West Africa prevalent. It is but yesterday when we believed that the diseases found on the "West Coast" were confined to the coast towns and districts, that sleeping sickness, yaws, guinea-worm and other well-known ailments were spread inland only of recent years, and we are wont to trace their origin to the expeditions of Stanley, and other European explorers by their incursions to the interior are accused in Africa of spreading disease along the tracks of commerce which followed upon these inroads.

This doctrine implies that there was little or no intercourse between the interior and the coast before the white man came, that the natives did not travel, and that tribes had no touch with each other except as enemies. These are fertile regions of which we write, and yet we are apt to assume that human life was stagnant as regards inter-communication. Such a condition of affairs is not met with even in the deserts of Africa. We are apt to believe that the desert is well-nigh barren of inhabitants. But anyone who has traversed these tracks of sand knows that such is not the case; that from behind any sandy mound, sharp-set eyes may be watching your every movement, and following in your tracks for days and weeks without your being aware of the fact. News travels fast in the desert it is said; and only by the contact

of peoples can this come about. Some say it is not so, but by signs and signals is news handed on, forgetting that human beings must be at no great distance from each other to give out and receive these signals, and that prolonged and renewed contact must have existed to arrange and practise even these primitive forms of signalling.

The absence of roads and of horses are intimately related, for if there are no horses in a country, there is no need for roads. It is, moreover, doubtful if ever horses flourished in Mongalla, for had there been horses at any time there would have been vehicles, and consequently roads, if even of a rough kind. There is, however, no trace of the one or the other; all these could not have been obliterated since Stanley's time, i.e., the coming of the white travellers, even in a country where the growth of vegetation is as rapid as it is found to be in Mongalla. Therefore it is logical to assume that the diseases met with are not of recent introduction, but have been prevalent in Mongalla and other inland districts of Africa for a period of time of quite ancient date. In Mongalla, Captain Neil Cantlie, M.C., F.R.C.S., states that guinea-worm, yaws, sleeping sickness, filaria and elephantiasis are met with.

We are wont to believe that these "West Coast diseases" were peculiar to the towns and districts along the coast, and that they were spread from thence by inter-communication as traffic increased along the course of the Congo. That this is not the case would seem proven, and instead, that in the inland districts of Africa the "coast" ailments were well known long before the so-called increase of traffic due to the white man's coming and were as prevalent in the interior as on the coast. In fact, the diseases in question may have reached the coast from the interior and not vice versa, as we have hitherto inferred. If further proof is required, it seems that the natives of Mongalla adopt the same method of extracting the guinea-worm—namely, twisting it round a piece of wood or match, carefully, slowly, and during successive days as we know the natives on the coast do. We believe also that sleeping sickness, which we associated with the West Coast only, was carried up the Congo into the watershed of the Nile, and the population of Uganda thinned to well-nigh vanishing point by the increase of traffic and inter-communication. This may be, and probably is, a pure assumption, for Mongalla, with Uganda on its eastern frontier, has had sleeping sickness and other West African ailments for many years before the traffic said to be due to the coming of the white man.

The cyclops, the intermediate host of the guinea-worm, is well known on the Mongalla rivers, and the disease is more prevalent after dry seasons than when rains are excessive, owing to the cyclops being able to maintain its existence when the rivers are low.

These points are of interest at present, as it is contemplated sending out a commission to inquire

into the method of treatment advocated by Dr. Marshall for sleeping sickness in Uganda. The Tropical Diseases Prevention Committee has taken up this question seriously, and is earnestly at work organizing and financing a body of experts to deal with the matter. We wish the Society success in its philanthropic work, and hope that facilities will be granted by the Government authorities for the Society's Commission to be aided and encouraged in every direction. We would urge the Commission to go to Mongalla first, for there they will find "virgin soil" for their investigations rather than in Uganda, where the disease, its cause and treatment, have been dealt with for some considerable time. In any case we hope that Mongalla will be visited by the Commission, for nothing has been done except in a sporadic fashion to study or eliminate disease from a fertile and important district.

It is useless confining the fight against tropical disease to one district of a country or to one country, however large. It would appear that equally with the shore so is the interior of Africa beset. With the exception of yellow fever no tropical disease can be said to have been eradicated. Malaria has been scotched in several local areas, but not in the sense of its elimination from England during the first half of last century by drainage of wide extents of country. Again malaria must be dealt with in the near future by a co-operation of nations and the enlistment of the people, the natives of the country, in the fight. Even to the elimination of the cultivation of rice in a country must malaria be fought to a finish. As long as rice is cultivated by flooding the fields it grows on, so will malaria defy us. Cannot rice be grown by some "drier" method? Cannot the natives in these regions find a substitute for rice? Can the world grow enough wheat to bring this about and the day arrive when rice is not the staple food of any tropical country? In China for instance, wheat is grown in the north, and rice fields are well-nigh unknown. The Chinese in these districts grow and eat flour, not rice, and malaria is rare amongst the northern Chinese.

China has even been exporting wheat to Britain. Had it been sold to Southern China the cultivation of rice would not be necessary in the south, and the infection by way of the flooded rice fields and the mosquitoes these fields generate would have been lessened and perhaps reduced to harmless limits.

The tsetse fly we know to be the cause of Africa's depopulated state, both of mankind and of certain groups of animals. All these problems have yet to be solved. The observers and their laboratories have told us the causes of several scourges; it now lies with the sanitarians to put the knowledge gained to a practical issue. The "dry" attitude at present in the ascendancy would, if it extends, diminish the cultivation of barley to the vanishing point, and if barley, why cannot rice be similarly dealt with, and its growth done away with or removed at a distance from human habitation, so that the mos-

quito it harbours cannot reach human beings in the village adjacent? These great questions are part and parcel of the work of the Tropical Diseases Prevention Committee, and it is to be hoped the Committee may be able to get to work and carry out the magnificent conception they have set afoot.

Annotations.

A Case of Creeping Disease contracted in Paris (J. Darier, *Ann. de Derm. et de Syph.*, vol. vi, 1920).—The author describes a case of myiasis of the hand in a railway employee. There was a red sinuous line along the back of the hand indicating the progress of the larva of the insect, and the patient complained of intense irritation. He was cured by excision of the affected area, which was microscopically examined, and the section showed presence of larva very clearly, which was situated not subcutaneously, but subepidermically. Probably this was the *Hypoderma bovis*.

Yaws contracted by American Soldier in France (J. F. Schamberg and J. V. Klauder, *American Journal of Tropical Medicine*, January, 1921).—The authors report a case in which the lesions in general were distinctly fungated and granulomatous in appearance, sharply circumscribed, varying in size from a large pea to a nut. They were present on the soles of the feet, the palms, the scalp, the prepuce, and the palmar aspects of the fingers. A dark field examination of the serum obtained from the surface of the lesions disclosed many treponemas having the morphologic characteristics of *Spirochæta pertinuis* Castellani. Wassermann performed with cholesterolized alcoholic syphilitic liver and acetone insoluble lipid antigens was 4 plus. Many of the lesions disappeared, and there was an improvement in others on the administration of neo-arsphenamin, 0.9 gm. Sixteen days later another dose was given which caused the disappearance of all the lesions, since when all Wassermann reactions have been positive. One of the skin lesions was used to inoculate four rabbits intratesticularly. In two rabbits positive results were obtained after an incubation period of thirty-four days. A second strain has been grown in rabbits, six out of eight being successful; average period of incubation being twenty-four days. Ten c.c. of the patient's citrated blood was injected intravenously into rabbits with negative results. Attempts to inoculate the anterior chamber of the eye in rabbits were negative. Attempts to inoculate a monkey's eyebrow have been unsuccessful so far. Complement fixation tests were performed with an antigen made from a yaws nodule from an infected rabbit's testicle. Salt solution was used in making the antigen rather than alcohol. The reaction with the serum of the yaws patient yielded slight but

definite degree of complement fixation. A duplicate test performed with the pooled serum of three syphilitics whose Wassermann reaction was 4 plus yielded negative results. The histological study of the yaws lesion showed the following: hyperkeratosis of the acanthosis of the epidermal tissues; extensive lymphoid and polymorphonuclear infiltration of the corium. Absence of blood-vessel changes. Spirochaetes in the leukocytic areas of the apices of the papillae, subjacent to the rete. The difficulty in staining the spirochaetes is suggestive of its being *S. pertenuis* Castellani rather than *S. pallida* Schaudinn.

Granuloma Inguinale (Meredith F. Campbell, M.S., M.D., *Journal of the American Medical Association*, vol. lxxvi, No. 10, 1921).—After treating five cases of granuloma inguinale the author comes to the conclusion that this disease is a clinical entity. It is endemic in the United States, particularly among negroes, and is probably not uncommon. The intracellular inclusions described by Donovan seem to bear a direct etiologic relationship to the disease. They are found with striking constancy. It likewise seems probable that they represent secondary invaders, promoting and perpetuating the process of ulceration.

The diagnosis of granuloma inguinale must be considered in all chronic ulcerative lesions of the genital and perigenital tissues, especially in negroes from the subtropical Southern States.

The intravenous administration of tartar emetic constitutes a specific treatment.

Flagellum of the Micro-organism of Rat-bite Fever (Kiyohisa Adachi, *Journal of Experimental Medicine*, vol. xxxiii, No. 5, May 1, 1921).—The work of previous investigators was confirmed in that the micro-organism of rat-bite fever was found to have flagella which are clearly visible by dark-field illumination and which can be stained. The best staining is obtained with alkalized Akashi solution, which is a modification of Giemsa's solution; the vapour of osmic acid gives the best fixation.

The number of demonstrable flagella seems to vary with the technic. Sometimes many slender flagella unite into one large one or one large flagellum divides into several smaller ones. It may be concluded that commonly many slender flagella occur at the ends, and that these may unite into one or several large flagella. In the living micro-organism the flagella appear to be spiral. Their form in fixed preparations depends upon the method employed. Some long forms have flagella rising at the middle of the body; this seems to indicate that division is transverse and not longitudinal as generally believed. The rigid body, the signs of transverse division, and multiple flagella seem to distinguish the forms reported here from spirochaetes and indicate that they are spirilla.

Abstracts and Reprints.

THE RENAISSANCE OF MEDICINE IN CHINA.¹

By E. V. COWDRY.

NATIVE physicians toy with life and death throughout China with child-like faith in the principles of medicine as laid down by the mythical Yellow Emperor, Huang-ti, in about 2696 B.C. The ideas enunciated by him and his followers are very deeply rooted in this great nation of approximately four hundred million people.

The doctrine of acupuncture, or of healing through pricking with needles, is productive of untold misery. In the courtyard of the Temple of the Universe (Tung Yueh Miae), just outside the East Gate of the Tartar City of Peking, on Chinese New Year, it is possible to watch the specialists at work. Patients are attracted by the display of a brightly painted chart illustrating different ailments and their cure through acupuncture. After the usual preliminaries the operator selects an appropriate needle, a short one for facial work or a long one for the thorax or abdomen, and plunges it into the body. Between acts he sterilizes it by passing it slowly through his hair. Sometimes the needles are used red-hot. A large bronze figure may be seen in the College of Imperial Physicians in Peking with numerous holes illustrating the position of the puncture points which is used as a sort of standard in acupuncture. I am told that schools of acupuncture are maintained, which, however, do not invite foreign inspection, and that teaching is carried on with the aid of similar statues. At the time of examination the statues are said to be covered with paper and the students required to insert needles at strategic points. By this ingenious method the students who have not learned the exact position of the holes are eliminated. After they have learned their trade, largely through apprenticeship, they begin to practise independently. They claim to refund the money which has been paid when cures are not made. The residences of well-to-do physicians are marked by a display of testimonial tablets from grateful patients. Juliet Bredon says, in her book on Peking, that a physician visiting a lady, merely hands a small figure of a nude woman through the curtains on which she marks the location of her trouble. He then prescribes for her. A great deal has been written about Chinese drugs, but few realize how many millions of dollars are spent on them annually. At a very famous store in Peking, established over three hundred years ago, they claim to sell \$1,000 worth of native drugs a day. This native medicine is not at all bad, but, considering its amount, it has a surprisingly small element of good in it.

Chinese are by nature very superstitious and are continually preyed upon by the priests. Our rick-

¹ Abstracted from the *Military Surgeon*, December, 1920.

shaw coolie, suffering from a cold, goes to a priest, obtains a paper dragon, which he burns and drinks with his tea. In the above-mentioned Temple of the Universe the god and goddess of medicine may be seen in the shape of two mules. On Chinese New Year the sanctuary is crowded with the halt, the lame, and the blind. Standing in the incense-laden air, listening to the monotonous tones of a great bell sounded by a ragged priest with a piece of wood carved to represent a human thigh bone (the Mongolians use the femur of a virgin), the scene is certainly impressive. The male mule of brass is the most venerated. After making a small contribution to the priest and suitable obeisance, the faithful draw near and rub the part that ails them and then the corresponding part of the mule. The eyes, worn smooth in this way, bear mute testimony to the terrible incidence of blindness in North China. The female mule is used in the same way by women. This method of healing through contact is very widely practised. In the South the image chosen is often that of an elephant.

It is not difficult for us to recall equally bizarre practices in Europe. The real difference between China and Europe or America is one of degree, not of kind. China is steeped in superstition; we are beginning to emerge from it.

The following agencies are concerned in the development of modern medicine in China:—

(1) Foreign Missionaries. Most of the pioneer work has been accomplished through the energy and devotion of foreign missionaries who have laboured faithfully in the face of prejudice and superstition. In 1913 the China Medical Missionary Association passed resolutions, which make their purpose clear.

(2) Foreign Agencies of Non-Missionary Character. The British Government has materially aided in the development of modern medicine in the South of China. It has been particularly successful in securing the goodwill and active support of wealthy Chinese in founding the Medical Department of the University of Hong-Kong. Even the President of China showed his interest in the enterprise by establishing the "Ta Tsung T'ung Ch'uan Hsueh Fei" fellowship for university students. The school buildings are up-to-date in every particular and command a magnificent view of the harbour. The equipment is excellent, the surroundings the finest and most healthful along the South China coast; all that is needed to make the medical department one of the best and most attractive in all China is an adequate full-time staff. The future of the institution is very bright in view of the broad-minded attitude of the authorities, that it is the purpose of the medical school to serve the whole of South China, not merely the colony and Chinese of British nationality.

(3) The Chinese themselves. The work of the Chinese Government should be most carefully considered. The Army Medical School, the Naval Medical School, the National Medical College, and the five Provincial Medical Schools are a good

foundation on which to build. They represent a conscientious attempt on the part of the Government to assume responsibility for the introduction of modern medicine. Military discipline is maintained at the Army Medical School as indicated by the guard at the entrance. The buildings are laid out on a comprehensive plan and are quite up-to-date. The late President, Yuan Shih-Kai, declared that "For a country to be strong and prosperous, it is essential that its citizens be healthy."

Unfortunately these schools have received very little foreign support, and it is doubtful whether they will accept any. One of their directors told me that open co-operation with a foreign institution might have a bad effect upon his annual budget owing to anti-foreign feeling. The condition is not improved by the attitude of some medical missionaries, who take but little interest in the Chinese schools because they see in them no opportunity for evangelistic work. One doctor dismissed the question by saying that "it is difficult to co-operate with them because they are only heathens anyway."

The underlying difficulty is the deeply rooted conviction, handed down for forty centuries, that the medical profession is but a fourth- or fifth-rate occupation. The entering classes of all the medical colleges combined amount to less than six hundred. This cannot be attributed to inadequate provision for premedical training, which can be easily obtained in Peking, Shanghai, Hong-Kong, and all the larger cities. It is interesting to note, for comparison, that the University of Toronto has an entering class in the medical school of 416 students, who will work in a country of about eight millions, already well-stocked with doctors. We cannot change the sentiment of a nation like China overnight nor yet in fifty years' time, but a beginning has been made in Peking, for example, where the splendid buildings of the new medical school of the Rockefeller Foundation will surely lead the people to doubt whether, after all, the medical profession is so very degrading. The raising of a despised trade to the level of a dignified profession requires long and sustained effort throughout the country, but until it has been accomplished, we cannot hope for any real development of modern medicine in China.

The people generally look upon disease and sickness in an apathetic and fatalistic way, believing that it is a visitation of Providence in punishment for their transgressions, or at any rate that it is the will of God, as our forefathers thought in Europe several hundred years ago, and some continue to think. While such views prevail there can be no real progress. This tendency to shift the responsibility from their own shoulders is characteristic of the Chinese in all their dealings, and will be very difficult to correct. They are handicapped also by certain customs, like foot-binding and the binding of the breasts in young women before marriage, which they still practice blindly, having forgotten their origin and not troubling to ask the why and the wherefore. They make their women cripples

for life and peculiarly susceptible to certain kinds of disease. I am surprised to find the impression among foreigners that foot-binding is rapidly growing out of date. No greater mistake could be made. The small sheds in the rear where, in some districts, the girls are kept during the time when the pain is most acute and they are apt to disturb the peace of the household, are just as well patronized as ever. Only among Chinese under direct and continuous foreign influence is a change noticeable.

It is imperative that we should learn to know the Chinese through the study of the science of anthropology. Owing to the widespread prejudice which still exists in China against human dissection, our knowledge is at present little more than skin deep. Soon, however, with more enlightened public opinion, we shall be in a position to study the Chinese through and through so that nothing will be hidden from us. Many characters must be studied and the aggregate results carefully weighed before we venture any opinion regarding the potentialities of the Yellow Race. The gradual reduction in the vermiform appendix in the course of evolution seems to be a progressive characteristic. If, on investigation, we should find that it is relatively larger in the Chinese, we should say that in this respect the Chinese are of a more primitive and lower type. Take also the question of the relative size of the brain. If it should prove to be larger in the Chinese than in Occidentals, it would be safe to conclude that in this respect it is we who are the more primitive. As evolution goes on, the size of the head at birth is increasing, so that more and more attention is being given to the pelvic outlet. A general increase of $\frac{1}{2}$ in. in its diameter would obviously bring about a great increase in the birth-rate. Unfortunately, no detailed measurements on a sufficiently large scale have yet been made, but it is an interesting thought that if the Chinese have our advantage in this respect, they will probably in time people the world.

The question of racial intermarriage is one of the great problems of our time. It should also be considered from every angle by skilled anthropologists with liberal support. The social ostracism which is at present accorded Eurasians is most distressing, particularly in the Orient. If it is found that the results of intermarriage are, on the whole, not definitely detrimental to the individuals themselves, to their offspring, or to the community at large, then we must curb the feeling of racial intolerance and see that justice is done.

NOTES ON TYPHUS.¹

By S. BURT WOLBACH, JOHN L. TODD, and FRANK PALFREY.

THE observations recorded in this report are based upon 182 cases of clinically well-established typhus fever. The patients were selected from among the

general admissions to the St. Stanislaus Hospital and were cared for in our own wards. Autopsies were performed on 39 cases. In 21 cases, dying before convalescence, rash, enlargement of the spleen and engorgement of the smaller vessels of the central nervous system were constant gross findings. Secondary bronchitis and broncho-pneumonia were present in 37 cases, and in 8 cases were the immediate cause of death. The distinctive pathology of typhus is microscopic.

Typhus is a disease characterized by lesions in the smaller blood-vessels. The vessels of the skin and the smaller vessels of the central nervous system are most often affected. The earliest lesion noted is a reaction of the endothelium; there is a proliferation of endothelial cells, followed by degeneration and necrosis. In larger vessels these processes lead to a formation of thrombi; in smaller vessels there is sometimes a destruction of continuity followed by an extravasation of blood. This occurs most often in the capillaries of skin and brain. An accumulation of polymorphonuclear leucocytes is an early response to the degeneration of endothelial cells. A perivascular accumulation of large mononuclear (endothelial) cells and of polymorphonuclear leucocytes occurs early in the disease and is most pronounced about blood-vessels supplying sweat glands. Massive accumulations of such cells are a secondary reaction to degenerative changes in the sweat glands consequent upon the cutting off of the blood supply. Occluding thrombi of the larger arteries and veins of the skin frequently occur, but mural thrombi are constant. These changes are so characteristic that a diagnosis of typhus can be made from skin excised during life; in only one other disease, Rocky Mountain spotted fever, do similar lesions occur. Thrombi and perivascular infiltrations, similar to those of the skin, are occasionally seen in the leptomeninges and in the basal ganglia. A lesion constantly present in the brain is the occlusion of very small vessels and capillaries. The occlusions produce minute areas of necrosis, with the usual reaction to such lesions in the brain, namely, polymorphonuclear and endothelial cell reactions followed by reparative neuroglia proliferation.

In the endothelial cells of vessels presenting lesions, a micro-organism has been found. It is similar in appearance to that described in Rocky Mountain spotted fever and in the typhus fever of Mexico. Although the examination of our material has been but commenced, the organism has been seen in thirteen instances in skin excised from patients during life and in twenty-two instances in tissues obtained at autopsy.

The most easily demonstrable form of the organism occurs in clumps; the individual organisms are pairs of slightly elongated bodies with tapering ends. They are surrounded by an unstained area. The length of a paired organism is from 1 to 1.5 microns. Isolated pairs, and groups of several pairs, are found with considerable frequency in swollen endothelial cells both in relation to thrombi and remote from lesions; they are found both in tissues taken during

¹ Abstracted from the preliminary report from the Typhus Research Commission of the League of Red Cross Societies to Poland.

life and in material obtained shortly after death. A second form of the organism, occurring much less frequently, is a minute paired granule which fills endothelial cells while they are still *in situ*. In skin excised during life and in tissues obtained at autopsy, peculiar swollen and vacuolated endothelial cells are seen; in our experience they occur only in typhus. In them are numerous granules which often completely fill the cell. The granules are very small; they are at the limit of visibility. We are studying them as a possible third form of the parasite. All forms of the organisms stain blue, by the methods employed. The larger paired forms are deeply coloured; the other forms retain the stains less densely.

Typhus was transmitted to guinea-pigs by the inoculation of infected lice. The disease runs the recognized course in infected animals; it has been transmitted by us through six passages in guinea-pigs. The gross changes produced in guinea-pigs by the disease are slight enlargement of the inguinal and axillary lymph nodes and enlargement of the spleen up to three or four times its normal size. Occasionally there is striking injection of cerebral blood-vessels. In male guinea-pigs there is often pronounced injection of the testes. As yet, the histology of experimental typhus has been studied in material from only fourteen guinea-pigs. The most constant and most easily perceived lesions are found in the brain; they duplicate, almost exactly, the lesions described in human brain. For the present, we think the presence of such lesions should be required as a proof of infection by typhus for all experimental animals. We require such proof in our own work before accepting a guinea-pig as having been infected, because we found, at autopsy, that intercurrent infections may produce temperature curves simulating those associated with experimental typhus. An absolute diagnosis can be made in a few minutes by recognizing the characteristic lesions in frozen sections of the brain of a suspected animal. The testes and epididymis often show an occasional vessel with lesions of the intima, thrombi and perivascular reaction quite similar to those observed in patients. Reactions as striking as those described by Neill have not been observed. The larger forms of the organisms, as seen in man, have already been found in the lesions of cerebral vessels in the guinea-pigs.

Lice were taken from Warsaw to North America and from Great Britain. The stock of American lice were fed on members of the Commission from January to June, 1920; the British lice had been maintained by Mr. Bacot for several years. The American stock remained free from micro-organisms of all types during the entire investigation. In the British stock a small number of females had a Gram-negative diplococcus (about 3 microns in length) in the genital tract. Early in the experimental work with lice (April 17) Mr. Bacot developed an illness consistent with trench fever (this incident will be described in a special communication). At the appropriate time the alimentary tract

of the British lice, which were fed on Mr. Bacot, became heavily infected with the minute extracellular organisms described by Arkwright and Bacot in trench fever and indistinguishable from *Rickettsia pediculi* of da Rocha Lima. Mr. Bacot's illness developed fourteen days after working with lice obtained from the supposedly healthy clients of a public bath house in Warsaw; organisms of a similar morphology were found in 11 out of 151 of these lice. No intracellular organisms were ever found in the British stock lice.

Having ascertained the organisms usually present in Polish lice, and having made certain that our stock lice were uninfected, a series of experiments were planned for the purpose of studying the organisms which might be acquired by our lice when fed upon cases of typhus fever. It was found that intracellular organisms appeared in a very large proportion of lice fed for one hour twice daily during a fortnight or more, on patients in the first ten days of the disease. The organisms are consistent in their characteristics with those described by da Rocha Lima as *Rickettsia prowazeki*. They are exceedingly pleomorphic. They vary in form from a minute paired body to a bacilliform organism measuring several microns in length. Both the minute and the bacillary forms occur in chains; the chains of bacilliform organisms often measure more than 15 microns in length. The organisms may be present in infected lice in extraordinary numbers. Every epithelial cell lining a louse's gut may be enormously distended by myriads of organisms; and, through the bursting of the cells, many organisms may be set free into the lumen of the gut. The distended cells of a heavily infected louse can be easily seen with a low magnification (objective 16 mm.) or even, unstained, with a dissecting microscope. All forms of the organism may be present in the distended cells of a heavily infected mid-gut; but the small forms occur most frequently, and as a rule occur in cells that are most distended. We have formed the impression that the bacillary phase occurs early in the infection of a cell, and that the minute form of the organism is characteristic of an advanced cell infection. As a rule all organisms, whether intracellular or free in the lumen of the alimentary tract, stain blue; occasionally organisms free in the gut are coloured red, possibly because of variations in technique.

CONCLUSIONS.

(1) In lice fed upon typhus patients under conditions determined to be favourable, a peculiar, pleomorphic micro-organism is constantly present.

(2) This micro-organism is that named by da Rocha Lima *Rickettsia prowazeki*.

(3) In the vascular lesions of experimental animals infected with typhus a minute micro-organism has been demonstrated. In morphology and staining reactions it is consistent with *Rickettsia prowazeki* in at least two of the forms in which it is seen constantly in lice.

THE IMPORTANCE OF THE MICROSCOPICAL EXAMINATION OF HUMAN MILK.¹

By L. GERSHENFELD, Ph.M., B.Sc.

THERE is no doubt in my mind that human milk is rarely, if ever bacteria free. Specimens that were collected under the most favourable conditions showed the presence of bacteria. This is not due to the fact that the healthy milk gland does not secrete a sterile product, but mainly for the reason that bacteria probably find their way through the nipples and other sources. Furthermore, there is little cause of arguing this question, for, after all, whether milk secreted by the milk glands is or is not germ free, it is a known fact that the milk at the time it is taken by the child, contains bacteria.

The bacteria of the healthy mammary glands form but a small proportion of the total bacterial content in milk consumed during nursing. The skin of the mother, directly or indirectly, through clothing, handling, &c., contributes the abundant quantity of bacteria found in human milk and fed to the child. Within the last four months two hæmolytic streptococci infections in nursing infants were traced by me to human milk. In both cases the physical examination of the mammary glands of the mother by the attending physician showed no inflammation, and the microscopical examination of the milk did not show any abnormal quantity of pus cells or cellular matter. It is, therefore, more than probable that these micro-organisms found their way into the milk from the skin of the mother. How many pediatricists and physicians advise the cleansing, washing, or merely wiping with a wet cloth, of the nipple and surrounding area, before nursing? And how many mothers actually take such a precaution?

In six different samples of human milk, collected under conditions almost identical with actual conditions at the time the infant is about to begin nursing, after a careful bacteriological examination I found only two of the samples of such a bacterial count as to regard it fit for consumption. The other four had a bacterial count ranging between 1,110,000 to 4,260,000 to the c.c. In the case of cow's milk, we hear of the cleansing of the skin of cows, the hands of the milker, the vessels used for collection and other implements. Why not observe precautions and cleanliness in the case of human milk?

It cannot be pointed out too frequently that the excessive bacterial contamination in human milk is not only avoidable, but unnecessary. It can be prevented to a large degree by closely guarding the simple rules of cleanliness. This involves no increase in expense. It usually means less suffering, little or no worry and, if anything, a decrease in expense in the long run. The time may come when the science of bacteriology will develop to an even greater exactness than it is to-day, and the direct relationship between many of the diseases of children may be traced to mother's milk, contaminated carelessly from the skin.

In addition to the previously outlined sources of contamination there may be another, that is, from a diseased mammary gland. The latter, when diseased to such an extent that a physical diagnosis reveals the fact, quickly places the attending physician on his guard. But it is those diseased conditions, wherein the mother apparently feels no discomfort, and where, nevertheless, an inflammation (or mastitis) exists, which produce a serious source of danger.

It has been my privilege to examine numerous specimens of human milk which, though the chemical analysis showed perfect samples, the microscopical observations, however, revealed the fact that they were highly contaminated with bacteria, lymphocytes, polymorphonuclear leucocytes, epithelial cells, and other cellular matter. In most of these instances, the mother felt no discomfort, while the nursing infant showed little or no progress. In many of them various diseased conditions prevailed. This was afterwards found to be caused by the use of contaminated milk. It is almost impossible to attempt to tabulate my findings in the many samples mentioned. In the first place, a total bacterial count was made only when asked for by the physician and experimentally in the few instances reported. A microscopical examination was, however, made on every sample. The Stokes method was used, a smear being made from the fat layer as well as from the centrifugalized sediment. In many of the instances a quantitative estimation of the leucocytes was made, the Doane Buckley method (as reported by them in 1910 before the Laboratory Section of the American Public Health Association) being used. The epidemiological connection between various attacks of illness in children and the use of the milk of mothers suffering from diseased mammary glands (not observable by a physical diagnosis) is not altogether clear, and the causative agents (i.e., types of micro-organisms or toxins) concerned therein are still obscure.

Little work has been done in regard to the occurrence of pathogenic and nonpathogenic bacteria in human milk, whether found naturally or through contamination. The occurrence of disease producing bacteria have been reported by some workers every now and then. To attempt to formulate standards is not an easy task, for anyone familiar with analysis of breast milk is aware of the existence of wide variations in chemical and bacterial compositions not only in samples from different individuals, but also in portions obtained from the same sample at different intervals. The structure of the mammary glands and their mechanism of secretion, together with the histological changes taking place during the periods of lactation, are familiar to all. The chemical examination of milk and the methods of correcting a faulty chemical composition have been studied thoroughly, and considerable data are available from which valuable information can be obtained. But the literature pertaining to the microscopical and bacteriological examination of human milk is far from complete,

¹ Abstracted from *New York Medical Journal*, vol. cxii, No. 25, December, 1920.

and the little that is available is uncertain. A more direct recognition of infectious diseases traceable to breast milk, obtained from a diseased mammary gland or introduced through other infectious human material is still to be produced by a close and thorough scientific study. Most of the information available is merely assumed and exact degree of danger from this source is needed.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE
EXOTIQUE. NO. 2, February, 1921.

Treatment of Haematuria with Methylene Blue (Gaston Daniel).—The author has successfully treated twelve cases of blackwater fever with methylene blue. No instance of anuria having occurred he considers the remedy specific and effective. Quinine may be used contemporaneously. The usual careful nursing precautions being observed, the treatment is as follows: Every hour the patient drinks half a tumbler of any light infusion containing 10 drops of a supersaturated solution of methylene blue in water. Intravenous injections of 1 c.c. of a supersaturated solution of the drug in 4 c.c. of water (making 5 c.c. in all) are administered at intervals of eight days. The dose may be quintupled without danger. Intramuscular or subcutaneous injections are avoided as painful. Each evening an intracellular injection of from 50 c.c. to 100 c.c. of physiological saline is given; the maximum quantity of 100 c.c. must on no account be exceeded, for even should the heart withstand the strain pulmonary oedema is likely to be produced. A daily injection of 1 mg. of sulphate or nitrate of strychnine may be recommended to assist the cure. The use of chloroform water to check the vomiting is absolutely contra-indicated. During convalescence the heart must be carefully watched.

Intestinal Parasitism in the Children of French Guiana and its Relation to the Purity of the Drinking Water (Marcel Leger).—Working in French Guiana the writer has investigated the theory formed by Soulié and Derrien in Algeria that the purity of water used for drinking purposes may be judged by the extent to which the people consuming it are infested with intestinal parasites. He found that while the water supplied to the town of Cayenne contained a maximum of 800 germs per cubic centimetre, and the records showed that typhoid was very rare, the rate of infantile intestinal parasitism was no less than 70 per cent. among ninety-two children between the ages of 1 and 12 years. In eighteen cases the infection was double and in eight cases triple.

Coccidiosis in Snakes (Marie Phisalix).—In snakes of the genera *Cerastes*, *Zamenis* and *Tropidonotus*, derived from different sources and dying in Paris in 1920, coccidia were found all of whom

presented the double peculiarity of belonging to the genus *Eimeria* and being localized in the gall-bladder and bile ducts. In each case only the extra-epithelial forms of the parasite were seen, without thickening or hypertrophy of either gall-bladder or ducts; this might no doubt be accounted for by the simultaneous manner in which coccidial infections often develop, and also by the fact that the reptiles having died a natural death the infection had reached the stage in which the cysts are liberated in the biliary cavities. For two of the parasites observed the names of *Eimeria ceratis* and *E. zamenis* n. sp. respectively are proposed; the third would appear to be identical with *E. cystis-fellea* Debaisieux.

Small-pox Inoculation in Se-Chouen (H. Jouveau-Dubreuil).—To the Chinese small-pox is a natural phenomenon, due to the expulsion from the system of impurities accumulated during fetal life. In order that the elimination may take place as early as possible the natives employ a method of vaccination which consists in introducing into the nostrils powdered crusts obtained from healthy children previously vaccinated. Unless some accidental ex-coriation exists in the nasal mucosa the probabilities are that the operation is unsuccessful. Since animal vaccination began to be practised by Europeans in China, a third method has been adopted by the more advanced native doctors, which consists in using crusts from children inoculated with calf lymph and applying them in powdered form to three small scarifications on each arm. As the two primitive methods are (1) of very doubtful efficacy, (2) rarely practised before the age of 1 year and frequently between 5 and 10, (3) never repeated (the supposed origin of small-pox rendering repetition unnecessary), (4) very expensive and therefore restricted to the middle and upper classes, (5) subject to many superstitions, and as, moreover, the people seem to be unaware that small-pox is contagious, the disease is everywhere endemic and serious epidemics occur.

A Plan of Campaign against Malaria in Madagascar (J. Legendre).—The most thickly populated districts of Madagascar, at one time perfectly healthy, are now suffering more and more from malaria. The solution of the problem lies not so much in medical treatment and prophylaxis as in piscicultural, hydraulic and agricultural measures. A regular system of irrigation should be provided in the rice fields, so that they are completely dried out as soon as the harvest has been gathered. Larva-eating fish should be introduced as soon as the fields are flooded. The inhabitants should be encouraged to grow other crops than rice where practicable; and no flooding of fields should be allowed immediately outside towns or villages or on sloping surfaces.

Hematological and Clinical Facts governing Cure in Repatriated Cases of Malaria (J. Rieux).—If repatriated cases of secondary malaria of the usual type be treated rationally with quinine the disease

begins to die out, in spite of relapses, during the winter and spring following the infection. Benign tropical malaria (*P. praecox*) is less persistent than benign tertian (*P. vivax*) or quartan (*P. malaria*). Signs of such extinction may be clearly seen between the sixth month and the fifteenth, and consist in (a) definite disappearance of the hæmatozoon from the peripheral blood, (b) return of the leucocyte count to normal, particularly as regards the large mononuclears, (c) reduction of the splenomegaly, (d) cessation of the attacks. It would therefore be justifiable to say that true manifestations of malaria, in properly treated cases, do not, generally speaking, last longer than a year after their return to Europe. The exceptions to this rule are in severe forms of the disease, usually with cachexia, where the infection has been repeatedly renewed, either in one season or from year to year. Should such cases continue to inhabit countries where malaria is endemic, they form reservoirs for the virus and assist in the perpetuation of the disease; if they are repatriated the process of cure is the same for them as for the others, but is longer and more difficult to complete.

Bovine Piroplasmosis in Morocco and its Relation to the Circum-Mediterranean Piroplasmoses (H. Velu).—Experience acquired by the author in northern Africa has led him to the conclusion that the piroplasmoses observed on the shores of the Mediterranean are rarely pure infections. Whilst the hæmoglobinuria of central and northern Europe is due exclusively to *Piroplasma bigeminum* or *P. bovis*, and east coast fever exclusively to *Theileria parva*, the piroplasmoses of the Mediterranean would seem in general to be caused by associations of parasites (*P. bigeminum*, *T. mutans*, *Anaplasma bigeminum*, *A. marginale*, *T. annulata*, *T. parva*, &c.) which contribute to produce widely different clinical types. Texas fever is due to *P. bigeminum* in intercurrent conjunction with *A. marginale*; "Tristezza" to *P. argentinum* and *A. argentinum*. In 1916 Steffo recorded a triple infection of *P. bigeminum*, *T. annulata* and *A. marginale* in cattle imported into Trebizond from Russia. Cardamitis apparently found *T. mutans* and *P. bigeminum* in association in Greece; but the *P. bigeminum* might in this case have been one of the pear forms noticed by many writers in many different countries. The existence of these various associations and various evolutionary forms of one and the same parasite makes precise diagnosis extremely difficult and in some cases impossible. It explains the failure of certain methods of treatment applied, and the obscurity in which the whole question is enveloped. It also shows the necessity for a comparative study of the various indigenous species of piroplasma in the Mediterranean countries. The Moroccan bovine piroplasmosis would appear to be a pure infection, and should therefore lend itself to research on the parasites themselves and the intermediary agents, facilitate the identification of the causal organism, and assist in the

solution of the complex and important question of preventive immunization.

Parasitism by Anguillula in French Guiana (L. Rousseau).—Testing the stools of prisoners at the French penal settlement in Guiana, among whom ankylostomiasis is very common, the writer found only fifteen individuals free from parasites out of a total of 123 examined. Of the remainder 79 showed ankylostoma eggs, 10 anguillula larvæ, and 19 both ankylostoma eggs and anguillula larvæ. For his diagnosis the author based himself on the principle that in tropical climates a larva seen in a stool within six hours (or indeed within twenty hours) after emission must of necessity be *Strongyloides intestinalis*. If kept in a temperature of 27-28° F., with no attempt at culture, a stool will generally give male and female fecal forms reaching their full size in forty-eight hours. Less frequently it will give strongyloid larvæ direct, the transformation never taking more than fifty-eight hours after emission of the stool. The strongyloid form of the ankylostoma, on the other hand, takes five days to appear. The parasitic intestinal forms of *S. intestinalis* are of considerable pathogenic importance, causing diarrhoea and emaciation.

The Positive Existence in French Guiana of Ankylostomum duodenale Dubini 1843 *simultaneously with Nerator americanus* W. Stiles 1902.—Brimont, Thézé and Marcel Leger are quoted as evidence that *Ankylostomum americanum* has hitherto been held to be the only species of ankylostoma existing in French Guiana. In some instances these authors have identified the worm by measuring the eggs only, but where a more complete study has been made the specimens have no less proved to be *A. americanum*. Examining the stools of two patients after treatment for ankylostomiasis the author found both *A. duodenale* and *A. americanum*, the proportions being 7 to 8 in one case and 6 to 4 in the other. The histories of both men apparently left no room for doubt that the infection had been contracted in Guiana.

Cases of Parasitism by Rhipicephalus sanguineus Latreille 1806 (R. Pringault and R. Vigne).—A woman in the south of France, suffering from intense pruritus on the shoulders and buttocks, attributed the irritation to a parasite she believed to have traced to a wild boar recently killed in the district. There were no general symptoms, no signs of itch, pityriasis or urticaria, and no macroscopic lesions of any kind except scratch marks. Sulphur baths and cooling ointments failed to allay the irritation. As the patient lived on a farm the domestic animals were examined for parasites, but none of the species in question were found; on the other hand, ten other people in the neighbourhood began to suffer from the same intense irritation and discovered similar lice on their persons. From specimens collected the parasite was diagnosed as *Rhipicephalus sanguineus* Latreille. A careful search for the ticks, morning and evening, was

recommended to the sufferers, but after the first few no more were found. Nevertheless, the pruritus did not abate in violence, and six weeks later (when the paper was written) still persisted. Examination of the insects showed that the rostrum remained intact; moreover, the parts of the body particularly affected were not those where the parasites were found. The phenomenon would therefore appear to be due to a sort of toxin, located probably in the salivary glands of the tick and inoculated by the bite. Inquiries for similar cases in other localities where wild boars exist have so far been unproductive.

On the Treatment of Malaria—An Essentially Curable Disease (Dr. Seguin).—It is of fundamental importance that treatment be begun as soon as the diagnosis has been microscopically confirmed, and continued without interruption until the blood is proved to be absolutely sterile. If the disease is taken during the "schizogonic" stage a complete cure may always be effected within ten days. To this end large doses of quinine are given by mouth; the quantity indicated is 4 grm. per day until the fever falls and subsequently 3 grm. per day until cure. If signs of intolerance should appear the dose is not reduced but discontinued altogether for one, two or three days, after which the daily 3 grm. are resumed. Arsenic is used in addition to the quinine and given by mouth in the form of arrhenal, 0.5 grm. daily for two or three consecutive days and then a break of the same length. Should gametes have appeared in the blood before treatment is begun, cure is longer to obtain but equally certain.

INDIAN MEDICAL GAZETTE.

Vol. lvi, No. 3, March, 1921.

Wassermann Survey of the Inmates of the Ranchi European Lunatic Asylum (Major O. Berkeley Hill, M.D., M.A.).—The entire population of the Ranchi European Asylum, which consisted of 186 persons, were examined by the Wassermann reaction. Of the total number, 73 reacted positively and 113 reacted negatively. None of the cases were general paretics. The total percentage of latent syphilis amounted to 39.24 among the total population. This is considered to be a very high figure when compared with the results from the New Jersey State Hospital, but when it is remembered that 75 per cent. of the native population of India is believed to be suffering from syphilis, either inherited or acquired, it is not quite so remarkable.

Cure of Hernia by Vaccine (S. Mallannah, M.D., D.P.H.).—Four out of six cases of hernia were completely cured by inoculating with vaccine, the other two were partially cured. The injection of vaccine produces a slight rise of temperature varying from 100° to 102° F. the same evening. The next morning the temperature drops to normal and remains normal throughout the treatment. With this temporary rise the patient feels some tender-

ness over the seat of the injection for a day or two and nothing more. A purgative is administered a day before treatment, and complete rest is enforced for ten days. Use of bedpan and glycerine enema is quite essential during this period. Afterwards the use of spica bandage for a month is required to complete the cure.

Strange Migration of a Round Worm (T. Maduramuthu Pillay).—A boy, aged 7 years, was brought to the dispensary with a soft fluctuating swelling on the upper right-hand side of the scrotum. On incision an ounce of thick, creamy, very foul smelling pus came out. A mature round worm escaped from the abscess when its sides were pressed. The whole worm was intact, measuring about 6 in. in length. Half of it was undergoing disintegration, and the other half was normal and of a slightly reddish colour. After the operation there was no discharge from the abscess and the healing was rapid and uneventful.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE.

RESULT of votes for election of President, Vice-Presidents and Council for two years:—

President: Sir James Cantlie, K.B.E., LL.D., F.R.C.S. *Vice-Presidents:* Andrew Balfour, C.B., C.M.G., M.D.; Sir Percy W. Bassett-Smith, K.C.B., C.M.G., F.R.C.S., Surg. Rear Admiral R.N. (retired); Prof. J. W. W. Stephens, M.D., F.R.S. *Council:* Col. A. Alcock, C.I.E., F.R.S., I.M.S. (retired); Major E. E. Austen, D.S.O.; A. G. Bugshawe, C.M.G., M.B.; Surg.-Cdr. R. St. G. S. Bond, R.N., M.B., M.R.C.P.; Lt.-Col. Wm. Byam, O.B.E.; Clifford Debell, M.A., F.R.S.; H. M. Hanschell, D.S.C., M.R.C.S.; Lt.-Col. S. P. James, I.M.S. (retired); Lt.-Col. J. C. Kennedy, R.A.M.C.; Col. W. G. King, C.I.E., I.M.S. (retired); J. C. G. Ledingham, C.M.G., M.D.; G. C. Low, M.D., M.R.C.P.; P. H. Manson-Bahr, D.S.O., M.D., M.R.C.P.; H. B. Newham, C.M.G., M.D., M.R.C.P.; G. Basil Price, C.M.G., M.D., F.R.C.P.; A. Leslie Sheather, B.Sc., M.R.C.V.S.; H. S. Stammus, M.D., M.R.C.P.; J. D. Thomson, M.B.; C. Morley Wenyon, C.M.G., C.B.E., M.B.; Warrington Yorke, M.D.

Medical News.

British Medical Association.—The annual meeting of the British Medical Association will be held, July 15-23, at Newcastle-upon-Tyne, under the Presidency of Professor David Drummond. On the occasion of the President's address, July 19, the gold medal of the Association will be presented to Sir Dawson Williams, editor of the *British Medical Journal* since 1898, in recognition of his distinguished services to the Association and the medical profession.

Original Communications.

NOTES UPON THE OCCURRENCE OF A TWELVE-DAY FEVER OF DENGUE GROUP IN NIGERIA.

By L. WYNNE DAVIES, M.D., and W. B. JOHNSON, F.R.C.S.,
West African Medical Staff.

DURING the months of July to October, 1920, cases occurred at Kaduna, Kano, Zaria, and Nara-guta, in the Northern Provinces of Nigeria, of a fever lasting about twelve days and showing many similarities to dengue fever. Rough notes upon fifteen European and three native cases form the subject of this report; detailed investigation was not possible owing to pressure of other work.

The prominent symptoms were fever, rash, in-tense headache and insomnia, with muscular pains and pain or weakness in the back. The illness was a severe one, with prolonged convalescence, but no fatal cases occurred.

SUMMARY OF SYMPTOMS.

Pyrexia.—Lasts from ten to thirteen days, usually at its maximum about the fifth to seventh day, and subsiding by lysis. The onset is not sudden, and there is no true remission of fever and symptoms, although a slight remission of pyrexia was noted on the fourth or fifth day in some cases. No recurrence of fever occurred in any case. Quinine had no effect upon the pyrexia.

Pulse.—Usually slow for the degree of pyrexia.

Rash.—Rubeolar, slightly raised. General distri-bution all over body, including face, hands and feet. Rash very profuse; never hæmorrhagic. The rash appears on the fourth to sixth day of illness and lasts for at least two weeks, and is visible though faded for several weeks. Flushing of the face is not marked.

Digestive System.—Bowel symptoms are not marked. Anorexia with furred tongue; deep pharyn-geal congestion; no vomiting; constipation usual; no abdominal tenderness or distension; no marked enlargement of liver or spleen; no jaundice.

Urine.—Albuminuria, slight in amount, is com-mon from the second to fourth day of illness, clearing early in convalescence.

Nervous System.—Intense headache and pain at the back of the eyes is constant, described in one case as if the eyes were being pushed to the back of the head. With this pain there is no coryza, suffusion of conjunctivæ is not marked, and there is only moderate photophobia. Insomnia is a troublesome symptom in all cases. Reflexes (knee jerks) are diminished. Muscular pains are common, and are often described as "bone pains"; pain in the back may be severe, and weakness of the back is often complained of. Nervous irritability and mental depression are present during the pyrexia, and tend to leave a neurasthenic condition in con- valescence.

Complications.—Rheumatic pains some weeks

TWELVE-DAY FEVER OF DENGUE GROUP.—BLOOD EXAMINATIONS.

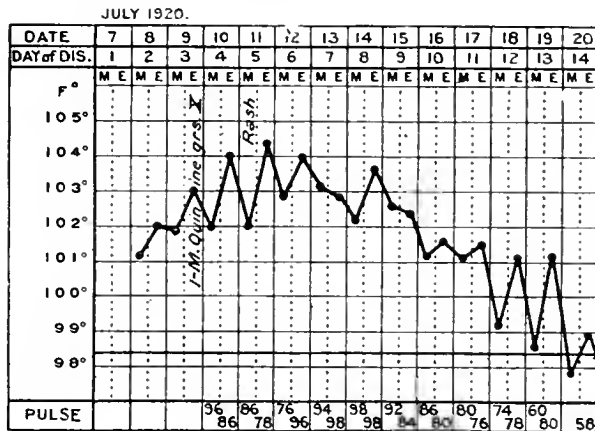
Case Number	Name	Race	BLOOD EXAMINATION									Days of disease on which serum taken	Result of test	Previous inoculation to typhoid group
			Leucocyte count	Differential leucocyte count					Parasites					
				Day of disease when examined	Poly.	Lymph	Large Mono.	Trans.		Eosin.	Mast.			
1	Capt. E.	British	4-8th days	Apparent leucopenia	Counts lost, but nothing to note except slight large mono. increase and increase and disappearance of eosinophiles	None	14th	Positive to Paratyphus B.	Several inoculations. Strong reaction when inoculated with Para A. 8 B., two years previously					
2	Mr. T.	British				None	16th	Positive to Paratyphus B.	Last inoculated with all group about two years ago					
3	Sgt. H.	British	27th days		No eosinophiles seen during first four days	None	12th	Positive to all typhoid group	Inoculated about two years ago					
4	James	Asaba native	4th day	Apparent leucopenia	72.0 7.5 16.0 4.5 —	None	13th	Positive to Paratyphus B.	Probably inoculated when on service in E. Africa in 1917-1918					
5	Dr. W.	British	5th day	Apparent leucopenia	67.5 5.0 21.0 6.5 —	None	12th	Negative	Had enteric 20 years ago					
6	Mrs. G.	British	5th day	Definite leucopenia	Small mononuclear increase	None		Not tested						
7	Mr. N.	British	6th day	Slight leucopenia (10,770 per c.mm.)	80.0 6.0 9.0 5.0 —	None	15th	Practically negative at 1 in 30, totally negative at 1 in 60 dilutions	Inoculated in 1914 or 1915					

TWELVE-DAY FEVER OF DENGUE GROUP.—TABLE OF SYMPTOMS.

Case number	Name	Race	Place of onset	Period of pyrexia in days	Remissions	Relapses	Rash			Urine	Symptoms						Complications	Result,
							Day of disease when rash appeared	Character	Distribution		Headache	Insomnia	Muscular pains	Pain in back	Flushing of face	Photophobia	Suffusion of conjunctivæ	
1	Capt. E.	British	Kaduna, South	13	None	None	5th	Raised papular	Extensor sur- face thighs; ab- domen, chest, arms; few on face	Albuminuria from 3rd day	+	+	Some	Some	-	±	±	Recovered
2	Mr. T.	British	Naraguta	13	None	None	6th	Raised papular	First on lower chest and ab- domen; later all over body, including face, chiefly on arms and legs	Albuminuria on admission on 10th day	+	+	Some	Some	-	±	±	Recovered
3	Sgt. H.	British	Kaduna, North	11	Slight on 4th day	Slight rise on 14th day	5th	Raised papular		Albuminuria on admission on 2nd day	+	+	Severe pain in left thigh and buttock without ob- vious cause	Not marked	-	-	-	Recovered
4	James	Asaba native	Kaduna, but prob- ably in- fected at Naraguta	11	Partial on 4th day	None	4th	Raised papular	Very extensive all over body, limbs and face	Albuminuria from 4th day	+	+	Weakness of legs, unable to stand	Marked	-	±	±	Recovered
5	Dr. W.	British	Kaduna, North	10	None	None	5th	Raised papular	Not profuse. Scattered over face, arms, ab- domen, back; few on legs	Albuminuria from 4th day	+	+	Some in limbs	Moderately severe	-	±	-	Recovered
6	Mrs. G.	British	Kano	12	Slight on 5th morning	None	5th	Raised papular	Very profuse. Extensor sur- faces arms and legs; face, neck, and very extensive on back	Albuminuria from 5th day	+	+	Severe in arms and calves of legs. Also in eye muscles	Severe in lower sacral region	+	-	±	Recovered
7	Mr. N.	British	Zaria, but probably infected at Kano	12	Slight on 4th day	None, but pyrexia from 13- 16th day due to broncho- pneumonia	5th	Raised papular	Very profuse all over body and limbs. Right conjunctiva also inflamed by eruption	None when tested on 6th day	+	+	Some	Severe. Back "felt like jelly."	±	±	-	Recovered

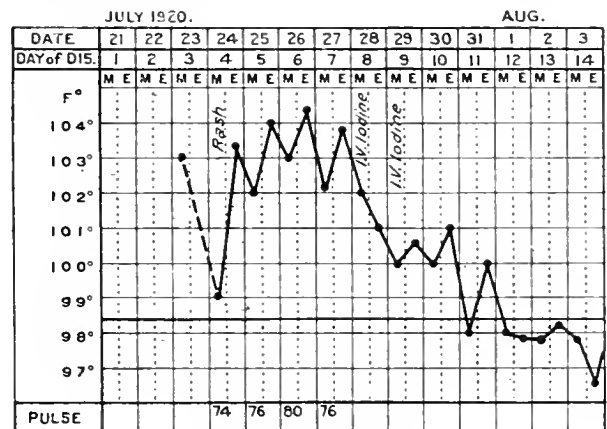
+ = present. ± = slight. - = absent.

after the acute illness (noted in one case). Iritis (noted in one case). Neurasthenia and bouts of insomnia (noted in several cases). No instances of arthritic swelling came to notice. Convalescence is slow.

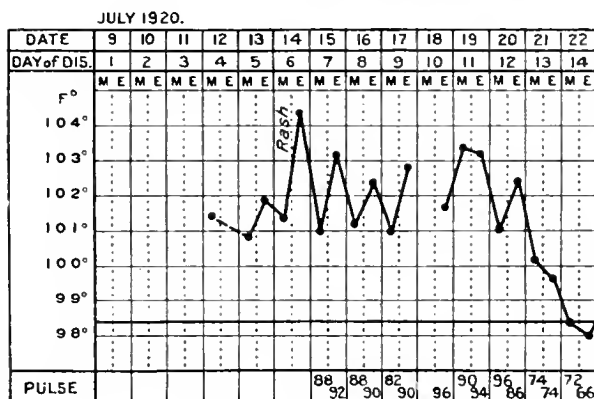


CASE 1.—British male.

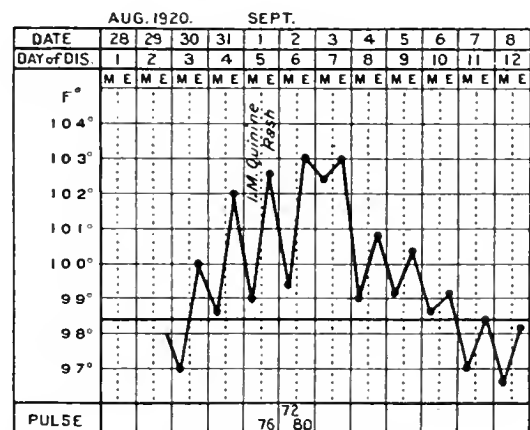
The serum gave a positive Widal reaction to *Paratyphosus* B in three out of six cases tested, and to all the typhoid group in one case. All these cases had, however, been previously inoculated against the typhoid group, with the possible excep-



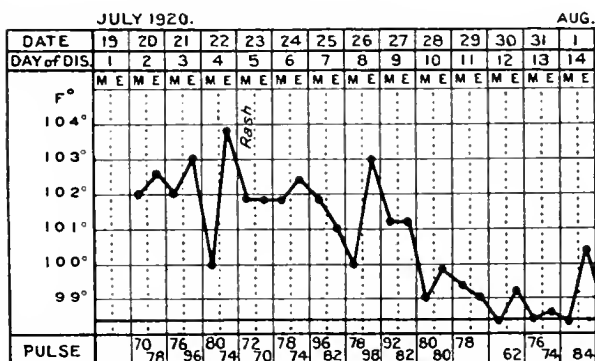
CASE 4.—Asaba native.



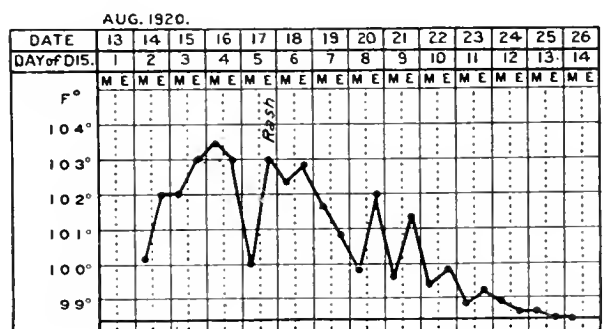
CASE 2.—British male.



CASE 5.—British male.



CASE 3.—British male.



CASE 6.—British female.

Mortality.—No fatal cases occurred.

Blood Examination.—No malarial parasites were found. A moderate leucopenia was noted during the pyrexial period, with disappearance of eosinophile cells during the early stages of fever. In some cases a small mononuclear increase was noted.

tion of one native case who had probably been inoculated when in East Africa with the troops two years previously. The positive reaction was only present in low dilutions.

Treatment.—Is symptomatic only. Quinine intramuscularly or by mouth has no effect upon the

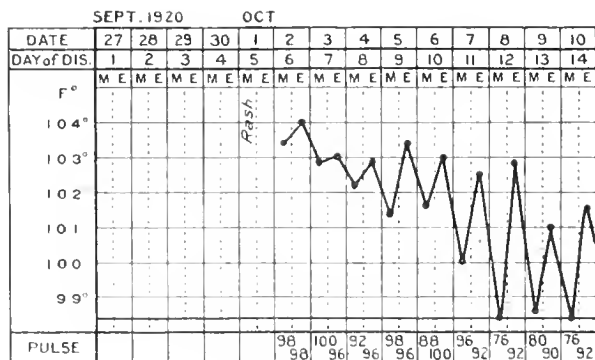
pyrexia and aggravates the headache and nervous symptoms. Salicylates and aspirin relieve symptoms, and hypnotics are necessary. In one native case intravenous injections of tincture of iodine in saline were given. This appeared to bring down the temperature, but as injections were not commenced until the eighth day of illness it is likely that the iodine was not the effective agent.

Epidemiology.—The incidence of cases corresponded roughly with the rainy season of the

insect, and the resemblance of this fever to dengue fever would suggest the mosquito. Most of our cases were Europeans, who are not exposed to the bites of fleas or bugs or lice, but are constantly bitten by mosquitoes and "sand-flies." The period from July to October, during which these cases occurred, corresponds to the period immediately after the maximum increase of domestic mosquitoes of the *Culex* group, the maximum anopheline increase being during October to November.¹ At the same time "sand-flies" (*Culicoides* sp.) are very troublesome.

There is little doubt that similar cases have occurred sporadically in Nigeria during the past few years, and it is of interest in view of the resemblance of this fever to dengue fever that an increasing number of "Syrians" from the Eastern Mediterranean are settling in Nigeria N.P., Kano as the largest trading site attracting the greatest number.

Tables of symptoms and of blood examinations, with temperature charts of eight cases, are shown.



CASE 7.—British male.

Northern Provinces of Nigeria. The rainy season of 1920 was a particularly heavy one. Cases occurred at widely distant stations, and in Kano and Kaduna, where several cases occurred, the distribution within the station was very scattered. Two cases occurred in one house where there were three European children none of whom contracted the disease although they mixed freely with the infected persons. One case was that of a medical

NOTES ON A CASE OF PSORIASIS.

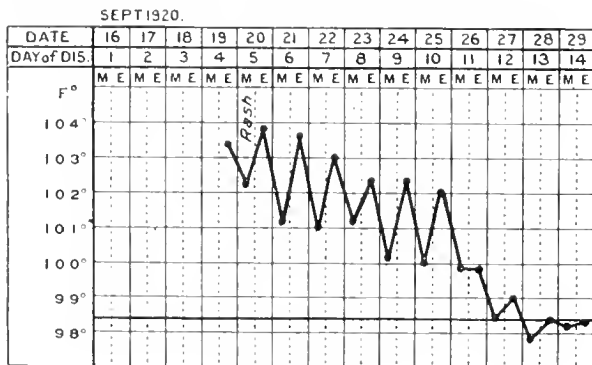
By A. VISWALINGAM, L.M.S., F.M.S. Government Medical Service.

TONG LEE, a male Chinese, aged 43 years, was admitted to hospital on July 17, 1920. He complained of a "rash" on the skin of his arms and legs of three months' duration. This rash is stated to have first made its appearance in small patches on the back of the elbows and hands, also on the dorsum of the feet, gradually spreading upwards. The affected parts are said to be itchy at times.

Previous History.—About two years ago he had a similar affection of the skin on the hands and feet which disappeared after a few weeks.

Present Condition.—Patient is fair skinned and emaciated. There are extensive patches of a scaly eruption on the dorsal and palmar surfaces of the hands, extensor and lateral aspects of the forearms, back of the elbows, point and back of the shoulders, dorsal surface of the feet, anterior and posterior aspects of the ankles, sacral and gluteal regions, and back of the neck up to the half margin of the scalp, while the pinna of both ears and the alae nasi are involved. The patches are irregular in outline. They are bilateral but asymmetrical. The scales are greyish and peel off in enormous quantity. On removal of the scales the underlying surface is found to be of a bright red colour. The scales are so crowded in places as to almost resemble the outer bark of a tree. The folds of the skin over the ankles and wrists are excoriated.

Blood Condition.—No parasite demonstrated. A differential count: Polymorphonuclears, 46.2 per cent.; large mononuclears, 9.2 per cent.; small



CASE 8.—British male.

officer who had been in attendance upon two other cases. One native case (Case No. 4 in table) was servant to a European (Case No. 2 in table), and developed the illness eleven days after the onset of his master's attack.

Evidence of direct contagion is, therefore, slight, and the scattered distribution of the cases points against water- or air-borne infection. It appears probable that the disease is conveyed by a biting

¹ See "Domestic Mosquitoes of the Northern Provinces of Nigeria," by W. B. Johnson, *Bull. Ent. Research*, vol. ix, p. 325.

mononuclears, 41.5 per cent.; eosinophils, 3.1 per cent.

About a fortnight after admission, almost the whole surface of the body with the exception of the face, the front of neck and the tip of the scalp, was involved. The stress of the disease seemed to be most marked on the lumbo-sacral region. During the late stages the skin assumed a condition of exfoliative dermatitis.

Treatment.—The patient was placed on a liberal diet of milk, eggs and fruit, while the lesions were treated with ung. hyd. nit. dil. and ung. chrysarobin (1 in 25), each being applied on one half



of the body. Both the drugs proved effective, and patient left hospital cured on August 27, 1920.

Remarks.—The case is of interest in that it is comparatively rare in the country and the likelihood of its being mistaken for pellagra on account of the initial distribution of the skin lesions. The want of exact symmetry, the rapidity of spread, the encroachment on the palmar surface of the hands, and the almost unimpaired health of the patient should preclude pellagra. The tendency of psoriasis to spread upwards should differentiate it from seborrhœic eczema, which first affects the scalp and later spreads to the face.

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THE JOURNAL OF

Tropical Medicine and Hygiene

JULY 15, 1921.

MEDICAL DISCOVERY AND ITS REWARDS.

SIR RONALD ROSS has been again dealing with that abstruse question, the Awards for Medical Services. The contention of the distinguished advocate is the concentrated essence of justice, and all sane men must agree, although it is only

but granting a system of small pensions in order to compensate medical men for work which has proved of public benefit. Perhaps it is better that the world of tropical medicine should be able to read Sir Ronald Ross's letter to the *Times* in its entirety.

[From the *Times* of July 13, 1921.]

"MEDICAL DISCOVERY.

"Awards for Public Services.

"To the Editor of the *Times*.

"SIR,—Early last year you were good enough to publish several letters from me on the subject of awards for medical discovery. A conjoint committee of the British Science Guild and the British Medical Association had been formed to call the attention of Government to the subject, and had suggested that a system of small pensions, somewhat on the lines of the Civil List Pensions, ought to be established in order to compensate medical men and others for work which had been of great advantage to the public without being remunerative to themselves. The justice and wisdom of the proposals were manifest to all; you supported the principle, and the Press in general followed your lead. On March 2, 1920, a deputation of the bodies mentioned, introduced and supported by influential members of Parliament, waited upon the Lord President of the Council, who received their suggestions with sympathy, but felt that there would be some difficulty in selecting particular candidates for the proposed pensions. Upon this, the committee wrote to the Prime Minister asking him to indicate or to establish some route by which awards might be obtained in deserving cases and suggesting that the powers of the Royal Commission on Awards to Inventors might be enlarged so as to include medical and sanitary discoveries and inventions; and he, I understand, still has the matter under consideration.

"Since then a case has come to my notice which illustrates the extreme disadvantages under which medical men now labour in the field of discovery and invention. Before or during the war Dr. H. made what I understand to be valuable additions to our methods of diagnosis by the X-rays, especially the localization of bullets in wounds. He therefore appealed to the said Royal Commission for leave to apply to it for some reward for his inventions, the Commission having been expressly appointed for considering such claims. He was, however, refused permission, on the ground (as he tells me) that the Chairman of the Commission had 'such a high esteem for the noble ideal which the medical profession had adopted for themselves in foregoing personal advantage in much of their work, giving their services free, discountenancing advertisement, and so on, that he was in favour of maintaining this spirit, and altogether against the idea that the Royal Commission could be persuaded to give an award to a member of the medical profession.'

This means that, while the inventors of life-destroying devices may be rewarded by the Commission on behalf of the State, those of life-saving devices, and indeed all medical men who improve medical and sanitary practice by scientific investigations or appliances, are to be rigorously excluded.

"Such a decision is probably good law, but it is nevertheless opposed to the interests of justice, of science, and of the public. There is this, and only this, to be said for it. The medical profession rightly objects, in the interests of suffering humanity, to medical discoveries or inventions being kept secret or monopolized by those who make them. It would be monstrous, for example, if a doctor were to patent a prescription or a new drug and allow no one but himself to use it—as happened, I believe, in the old case of 'Warburg's Tincture.' But this does not mean that those who have made such discoveries or inventions and who have not kept them secret and have not monopolized them should be deprived of all reimbursement for their pains. Just the converse. These are precisely the cases in which the State is justified in making good the losses which conscientious medical men incur by their altruism. It is precisely because medical men do not patent their ideas that the State should endeavour to reward them in other ways; and I should have thought that the Royal Commission was just the body to consider and confer such rewards. Instead of that, if I rightly read the passage quoted above, it has decided that the medical profession is to be discriminated against and penalized for its own high public spirit in this matter.

"I quite understand that the Royal Commission must act in the interests of the taxpayers as well as in those of inventors, and I am not competent to judge of the soundness of the argument used—as a legal argument. But I fear that most ordinary people will look upon it as being merely a specious plea put forward to enable the State to avoid its just obligations to its medical benefactors; and, in conclusion, I would ask two questions: (1) Is it proper for any State to utilize the professional services of professional men (often very poor men) for nothing? (2) Is this attitude likely to encourage those laborious and self-sacrificing studies by which alone the more difficult problems of disease can ever be solved?

"I am, Sir, your obedient servant,

"RONALD ROSS.

"36, Harley House, Regent's Park, N.W.1,
"July 11."

According to the public statements and belief, the medical profession should neither expect remuneration nor be granted rewards for discoveries made within the sphere of science. It is said to be a noble ideal which the medical profession had adopted for themselves. The quack is permitted by Government to do otherwise. Pills and potions, mixtures and drops secretly made, and sold at prices often several hundred per cent. above

the cost of the production, meet the practitioner's eye as he journeys about from house to house; his reward for honest dealing is a pittance. The quack's secret remedies bring him affluence; profiteering is his business, and he gets titles bestowed upon him equal in degree and far above the proportionate number given to the foremost of our medical men who give an honest and conscientious service to the poor. Would the world be worse off were all quack remedies declared illegal? Has any known secret remedy raised the efficacy of our curative measures? Who has discovered one fact or shown mankind the causes of diseases whereby alone true medical science has advanced? Has the secret potion and its quack advertiser done any good to the public? Yet is he granted permission by law to sell his wares, to rob the public of money for worthless remedies, and lower the position of the medical profession in the eyes of the public. Keep the doctor down is and always has been the keynote of the attitude of authorities towards medicine. Who had charge of the plague outbreak in Hong-Kong in 1894?—a solicitor in Government employ. Who had charge of the plague epidemic in Bombay when it broke out in 1896?—General Gatacre; and this system of setting the doctor aside has been followed everywhere. Colonel Gorgas broke the spell it was hoped for ever; but stereotyped custom has been able to set aside Gorgas's great example.

It has ever been an uphill fight for the doctor to attain his position. He has got it now in the Army but only the other day; the regimental surgeon is no more, and the doctor is now an officer in command of the units of his corps as in other branches of the Service. The same thing has to be fought out in civil life, and that it will come, as Gladstone prophesied some years ago, is as sure as that science will triumph and all men must pay homage to the medical men who have advanced medicine within the last few years to a degree unequalled by any other branch of scientific endeavour or discovery.

No Schistosomiasis in Cuba.—In a letter addressed to the Editors, dated March 11, 1921, Dr. Juan Guiteras, Habana, drawing attention to a paper by Dr. Frank Milton on "Suggestions for further research in schistosomiasis," writes as follows: "Schistosomiasis (Mansoni) extends up the chain of West Indian Islands as far as, and including, Porto Rico. Now *Planorbis guadelupensis* also extends to Porto Rico. There is no schistosomiasis in Cuba, although Cuba has received a large immigration from Porto Rico, and also the largest and latest importation during the slave trade times. Although there are no *P. guadelupensis* in Cuba, there are other species of *Planorbis*. The exemption of Cuba from West African diseases, in spite of slave trade connections, is interesting. We have no filaria except *Bancrofti*."

Innotations.

Bacillus Botulinus Toxin (P. F. Orr, *Journal of Medical Research*, January, 1921).—The toxins produced by ten different strains of *Bacillus botulinus* were found by the author to be comparatively thermolabile. All trace of botulinus toxin was destroyed by heating any food material to the boiling point.

Experiments on the Carriage of Intestinal Protozoa of Man by Flies (Francis M. Root, Ph.D., *American Journal of Hygiene*, vol. i, No. 2, March, 1921).—Free forms of *Entamoeba histolytica* and *Chilomastix mesnili* ingested by flies were killed in an hour or less, not encysting. Motile *Chilomastix* were observed in a fly's faeces seven minutes after it had fed on a stool containing them.

Cysts of the intestinal protozoa ingested by flies were gradually killed in times varying with the species. When flies which had ingested cysts were drowned in water, the cysts survived much longer.

In experiments designed to test the maximum capacity of flies at a single meal, it was found that a single house-fly (*Musca domestica*) could ingest 0.0068 c.c. of fluid and a single blow-fly (*Calliphora erythrocephala*) could ingest 0.022 c.c.

An infection with *Herpetomonas muscae-domesticae* was found in only one out of 225 specimens of *Musca domestica* examined at Baltimore. Two infections with *H. calliphorae* were found in 124 specimens of *C. erythrocephala* examined.

The author emphasizes the importance of flies as carriers of disease-producing organisms from human faeces to human food. Flies feeding on a human stool containing cysts or free forms of intestinal protozoa will take large numbers of them into their intestines and deposit them again in their own faeces. Since all stages of the protozoa are killed within a few minutes by drying, such fly faeces are only dangerous to human beings when deposited on moist or liquid foods. The experiments reported show that the time of survival varies for the cysts of different species of protozoa. If a fly containing cysts is drowned in water, milk, soup or other liquid food, the cysts will live longer, sometimes a week, and it is possible that human beings swallowing such dead flies might be infected.

Swelling of Pinna, an Early Sign of Deficient Antiscorbutic Vitamin (H. Sheasby, *The Practitioner*, March, 1921).—Swellings of one or both ears among the occupants of a group of internment camps in England were diagnosed as infective cellulitis, and one or two of the earlier cases were incised, but no pus was found, and the condition persisted in spite of the usual treatment for cellu-

litis. As more cases occurred, a further inquiry was made, and it was found that the sign was due to a mild degree of scurvy. In twenty-four out of thirty cases one ear only was affected, in the remainder both ears were involved to a greater or less extent. No involvement of the gums or ecchymoses could be detected, and beyond slight weakness and pallor, no other sign of scurvy could be made out. The symptoms disappeared completely when vegetables and potatoes were cooked separately and not stewed with the meat, and no further cases occurred.

Myiasis in a Case of Favus without Scutula (M. Carruccio, *Giorn. Ital. d. Mal. Ven. e della Pelle*, 1920).—A case of favus in a soldier is recorded. *Achorion schonleini* was found in the hairs and scales, but no scutula. Large swellings formed on the scalp with crateriform openings, from which seropus and larvæ were extruded on pressure. The larvæ were reared and developed in the adult fly, *Sarcophaga affinis*.

Effect of X-rays on Trichinæ (Benjamin Schwartz, *Journal of Agricultural Research*, vol. xx, No. 11, March 1, 1921).—Encysted trichinæ are injured by relatively heavy dosages of X-rays. So far as has been determined the injuries are not visible in the encysted or artificially decapsuled larvæ as structural or functional disturbances, but become apparent only when the larvæ reach a suitable host animal in whose intestine they are normally capable of continuing their development.

Trichinæ from meat that has been exposed to strong dosages of X-rays undergo a rapid granular degeneration in the intestines of suitable hosts before they attain maturity.

Encysted larvæ that have been exposed to lower but still injurious dosages of X-rays are able to continue development in the intestines of suitable hosts. Such larvæ, however, do not attain structural and functional sex maturity. The sex cell appears to be atrophied, and no evidence of successful copulation can be found. X-rays, therefore, appear to exert a more or less selective action on the gonads of trichinæ.

The experiments described by the author in this paper do not warrant any definite conclusions as to the feasibility of using X-ray radiation as a practical means of destroying trichinæ in pork.

Entamoeba found in the Tonsils (E. Tibaldi, *Annali d'Igiene*, vol. xxx, No. 10, October, 1920).—The author has named the amoeba he has discovered in two cases out of twenty diseased tonsils *Entamoeba macrohyalina*, as he thinks it is a new species. In both of the two cases there was concomitant otitis, plus mastoiditis in one case.

Abstracts and Reprints.

SOME SURGICAL COMPLICATIONS OF DYSENTERY.¹

By R. J. McNEILL LOVE, M.B., B.S.

(1) CASES OF DYSENTERY FAILING TO RESPOND TO MEDICAL TREATMENT.

IN the summer of 1916 and early part of 1917, cases of acute bacillary dysentery were common, the illness being sudden in onset, with fever, diarrhoea, tenesmus and a passage of blood-stained mucus, which, in spite of medicinal and serum treatment, rapidly went downhill. Cæcostomies were performed as a last resort in some of these cases, but as they were suffering from severe toxic absorption, the results, as one expected, were discouraging, and operative interference was soon abandoned.

The cases of election for surgical interference are chronic cases which slowly retrogress in spite of medical treatment. In these it is found that, in spite of anti-dysenteric measures, it is impossible to increase the diet and rebuild the patient's strength. They seem to go downhill merely from starvation. They tolerate a diet scarcely or not even sufficient to maintain metabolism, and, when any effort is made to increase it, a relapse immediately occurs. In these cases a weekly record of weight is useful, and a patient who steadily loses weight despite treatment, and in whom it is found impossible to increase the diet, should be considered a fit subject for surgical interference.

Careful observations of the pulse are of extreme importance in forming an opinion regarding the progress of the cases. The rate, tension, and regularity should be frequently observed, and, if emetine is being administered, allowances should be made for the effect the drug exercises on the condition of the pulse.

Usually, three courses are open to the surgeon: appendicostomy, cæcostomy, and ileostomy. In considering which to adopt, it is important to realize exactly how an operation will help the patient. An appendicostomy permits of direct lavage of the colon; but as it has been proved by bismuth enemata that the whole of the large bowel can be reached by rectal injection, appendicostomy seems to be of little value. This was borne out in a few cases in which the operation was performed in this hospital; these derived so little benefit that the operation was soon abandoned.

Cæcostomy and drainage by Paul's tube gave distinctly better results, but drainage was never complete, and in cases in which cæcostomy was performed the condition of the patient seemed to vary in proportion to the freedom of the drainage through the cæcal fistula. It appears that the essential need of the dysenteric colon is rest.

In considering the relative merits of cæcostomy and ileostomy, the former is easier to perform as well as to close when no longer needed. Cæcostomy also

¹ From the *Practitioner*, July, 1920, No. 625, cv., No. 1.

allows free and easy irrigation of the large intestine from cæcum to anus. However, drainage by cæcostomy is apt to be very uncertain. In several cases in which it was performed, satisfactory drainage was obtained, but in others very little bowel contents was discharged through the cæcal fistula. Possibly this difference depends on variation in the antiperistaltic movements of the ascending colon in different patients. On the whole, ileostomy appears to be the more satisfactory operation, in that it provides absolute rest to the diseased colon, which is not irritated by undigested food, nor is there any passage of faecal material to stimulate peristalsis. If ileostomy is performed a few inches from the cæcum, the continuity of the bowel can be restored by lateral anastomosis of the small intestine; also the final operation may consist of implantation of the small intestine into the ascending colon.

In conclusion, appendicostomy seems to be of little value, and although cæcostomy is sometimes satisfactory and requires less operative skill to perform and close than ileostomy, the latter affords the maximum amount of rest to the colon, which, apparently, is of far greater importance to the inflamed colon than local treatment, and if lavage is required it can be carried out *per rectum*.

Liver Abscess.

The signs and symptoms presented by these cases varied greatly from those described in text-books. Some of these cases were surprisingly acute in onset. In one case, the patient was quite well until ten days before operation. A liver abscess was drained, but eight days later he died, and four other abscesses were found post mortem. Another man, who had spent his life in England until sailing direct for Mesopotamia, found himself in hospital less than a month after landing in the country. He was suffering from liver abscess, about a pint of pus was evacuated, and amœbæ found in the subsequent discharge from the sinus.

In well-marked cases, the diagnosis is not usually difficult; a history of attacks of diarrhoea is commonly elicited, and *Entamœba histolytica* are generally found in the stools. The patient usually complains of progressive weakness, anorexia, and not uncommonly pain in the right shoulder or hypochondrium. An acute onset sometimes occurs, and is probably due to a latent abscess becoming infected, or reaching the surface of the liver and causing a localized peritonitis.

Peritonitis and basal pleurisy account for most of the acute exacerbations occurring during the course of the disease.

Vomiting is a symptom which occasionally occurs, especially when the abscess is pointing from the under-surface of the liver, or situated in the left lobe.

Jaundice, with a trace of bile in the urine, was noticed in one case. An oscillating temperature is the rule, although in one case the temperature was not above 99° F. until three days previous to the

evacuation of a large abscess. The pulse-rate is relatively slow in proportion to the temperature.

Except in small, single abscesses, enlargement of the liver can usually be demonstrated by the X-rays. In typical cases, screening may show the liver to be enlarged upwards, the excursion of the right leaf of the diaphragm to be limited to 1 in. or less on a deep inspiration, and possibly a conical projection of the right cupola, indicating a pointing abscess—any of which signs are of great value in supporting the diagnosis of liver abscess.

The cytological examination of the blood usually shows a leucocytosis and increased proportion of polymorphic cells, the most impressive white cell count being 43,000 per cubic millimetre, with 89.8 per cent. polymorphonuclear cells.

The blood examination is especially useful in distinguishing simple and suppurative inflammation of the liver. On one occasion, a case was admitted to the surgical side as liver abscess. He had been recording an irregular temperature of 99° to 102° F. for three weeks, had decided hepatic enlargement, and was negative to malaria. His blood-count showed 18,500 leucocytes, but of these only 60 per cent. were polymorphic. The condition proved to be one of dysenteric hepatitis, and responded to dieting and emetine injections.

Another condition simulating liver abscesses was a curious syndrome locally termed "Bink's disease," so called from the Medical Officer who first drew attention to it (Captain H. B. Binks, R.A.M.C.). The clinical features of this condition were progressive weakness, irregular temperature, mild diarrhoea, and occasionally moderate enlargement of the liver and spleen. With the exception of secondary anæmia, a mild leucocytosis (12,000 to 20,000) with an increase of mononuclear cells and proportionate decrease in the number of polymorphic cells, all pathological reports on blood, stools, &c., were negative. This condition frequently baffled all treatment both rational and empirical. The illness lasted many weeks, and often terminated fatally; the only constant condition post-mortem was slight, irregular, patchy ulceration of the mucous membrane of the lower ileum and colon. Occasionally, submucous hæmorrhages were noticed in the valvulæ conniventes in the ulcerated area, and more commonly moderate enlargement of the liver and spleen. Dysentery, enteric, and tuberculous disease were always excluded, and the nature of these cases remained a mystery.

As a liver abscess is frequently accompanied by compression of the right base of the lung or effusion in the pleural sac, it may readily be confused with right-sided empyema, and in some cases the exploring needle may be the final court of appeal. Perinephritic abscesses can usually be excluded by examination of the urine, and psoas irritation and other forms of sub-diaphragmatic suppuration by symptoms referring to the primary lesion.

In doubtful cases of liver abscesses with insufficient signs to warrant needling, or where needling was negative, treatment was carried out by dieting and emetine injections. It is possible that in this

way small abscesses may be absorbed, but there is also the danger of increasing the resistance of the liver to amœbic invasion, and that a small abscess may become temporarily walled off by a zone of resistant tissue. This zone is an efficient barrier against toxic absorption and further invasion of the liver only as long as the patient is under good conditions (e.g., in hospital); on returning to the privations of active service, the general resistance of the patient again becomes lowered and the abscess may recommence its work of destruction. Hence, cases of suspected liver abscess which apparently recover with treatment should be kept for a considerable time under close observation, and, if possible, evacuated to a healthy climate.

When pus is suspected, the liver should be needled, the exploration being conducted in the theatre, so that, if successful, further surgical treatment may be proceeded with.

In this hospital it has been the custom, on discovering pus, to leave the needle *in situ*, and excise a piece of rib as for an empyema; the costal and diaphragmatic pleuræ are then sutured, and the diaphragm incised at right angles to the direction of the muscular fibres, so that its contractions will not interfere with drainage. Using the needle as a guide, the liver tissue is gently broken down until the abscess is reached. The abscess is drained by a rubber tube wrapped in gauze, and the healing frequently assisted by irrigation with weak quinine solution. By this means, free exit is given to the pus, which is sometimes too thick to permit of aspiration.

In one case, in which pus was confidently expected, ten punctures failed to reveal an abscess, although flakes of thick material resembling lymph were sucked into the syringe. As the liver was also enlarged downwards, a laparotomy was proceeded with and two abscesses on the under surface of the liver discovered and drained. The patient died the following day, and post mortem four abscesses in the left lobe and thirteen in the right were discovered. The needle was of wide bore, but the pus in the abscesses was thick and gelatinous, apparently too thick to flow, for it is highly improbable that with so many abscesses one or more were not tapped.

Several cases passed through this hospital in which an abscess was aspirated and quinine (30 gr. in 10 oz. of water) injected into the cavity. In cases with a single abscess, and where the pus is thin and can readily be aspirated, this treatment seems to be sufficient. However, in one case the complete operation was the means of relieving the patient of a second abscess which spontaneously emptied itself into the existing sinus, after which the patient's convalescence continued uninterruptedly.

Abscesses pointing towards the peritoneal cavity are opened and drained through an abdominal incision. A course of emetine (1 gr.) daily for twelve days is usually given after the operation.

The prognosis of liver abscess in Mesopotamia was invariably grave, for the abscesses were frequently multiple.

(2) SURGICAL CONDITIONS SECONDARY TO DYSENTERIC INFECTION.

Peritonitis.

In some of the acute cases of dysentery the bowel wall is so devitalized that it allows the escape of organisms directly into the general peritoneal cavity. In one case, purulent general peritonitis supervened five days after the onset of acute bacillary dysentery. A laparotomy was performed and drainage tube inserted. A post-mortem the following day revealed the colon acutely inflamed, œdematous, with submucous hæmorrhages, but no perforation of this or any other viscus.

A more common cause of acute peritonitis was leakage from a dysenteric ulcer, or in some cases actual sloughing of areas of the bowel. These cases usually occurred during an attack of acute amœbic dysentery. Naturally, they did badly, for, owing to debility of the patient, the tissues were usually not sufficiently resistant to localize the infection to any great extent.

Appendicitis.

Pain in the right iliac fossa during dysentery is common, usually being due to changes in the cæcum. In some cases, œdema and infiltration around the appendicular orifice possibly predispose to obstruction of that organ, and efforts to empty itself are sometimes responsible for the colicky pain frequently met with in dysentery.

Five cases were operated upon as appendicitis complicating an attack of dysentery. In three of these, a typical dysenteric ulcer was found in the appendix, and on removal of that organ the dysentery resumed its normal course. In the other two cases, the cæcum was at fault; in one, a small leak had occurred from an ulcer, and in the other, part of the cæcal wall had sloughed away, causing a localized peritonitis, indistinguishable from that due to appendicitis. In the three patients from whom the appendix was removed, the dysenteric ulcers would probably have responded to medical treatment. However, their symptoms were sufficiently urgent to indicate exploration, and delay was unjustifiable in that the diagnosis lay between dysenteric appendicitis and perforation of the bowel.

Parotitis.

It has been suggested that this condition, occurring as a complication in an infective disease, is analogous to acute infective pancreatitis; but a more probable cause is direct infection from the mouth along Stenson's duct. Certainly, these cases were more common in the earlier days when, owing to limitation of personnel, the standard of nursing was below the high level which later prevailed, hence patients' mouths could not then receive all the attention they merited. It was a very distressing complication for the patient, for by limiting the extent to which he could open his mouth it greatly increased the difficulties of oral toilet; a vicious circle was then readily formed. In early stages, as well as in those cases in which parotitis was liable to occur, risk

of infection was minimized by increasing the flow of saliva, secretion of which was not only diminished by the disease, but also by the hot weather. The flow was stimulated by encouraging the patient to suck the juice of oranges, "acid drops," &c., and its increase assisted in flushing out the salivary ducts, and helping mechanically to cleanse the mouth.

Many cases, however, proceeded to suppuration, with œdema of the side of the face, especially over the gland; when suppuration occurred, pus could be expressed along Stenson's duct. Usually no definite abscess cavity occurred, the gland being infiltrated with pus, and on incising below the gland of the jaw and exploring by Hilton's method, not more than a few drachms of pus were evacuated. If untreated, the pus frequently discharged itself through the external auditory meatus.

Arthritis.

It appears that this complication is liable to ensue at any period after dysenteric infection, although it most commonly began during the convalescence of chronic cases. In cases in which anti-dysenteric serum has been given, it is important not to confuse joint symptoms arising from the injection with true dysenteric arthritis.

In cases occurring in this hospital, the patients usually complained of pain and stiffness affecting one joint only, and definite effusion and fleeting pains were uncommon. The knee-joint was most commonly affected, the wrist and shoulder occasionally being attacked.

The condition closely resembled the peri-articular form of gonorrhœal arthritis, the ligaments and tendons bearing the brunt of the infection. The condition appeared but slightly affected by treatment, although Scott's dressing and subsequent massage relieved the pain, but as the patient's strength returned the inflammation slowly subsided.

Perinephritic Abscess.

Prinephritic abscess was so frequently met with among men who had previously suffered from dysentery that it was commonly looked upon as a sequela of this disease. It was probably due to the devitalized colon allowing passage of pyogenic organisms into the circumrenal connective tissue, which, being uncovered by peritoneum, is in direct apposition with the posterior of the colon. One case, at least, was due to a liver abscess pointing in the kidney region. In this case, prior to the evacuation of pus, the liver could be felt three fingers' depth below the costal margin, and amœbæ were subsequently found in the pus.

In early cases, the patient complained of malaise and pain in the loin, which was especially troublesome during periods of physical exertion. The examination in an earlier case showed little beyond some rigidity over the front of the kidney or tenderness along the outer border of the erector spinæ, together with irregular fever and usually albuminuria. In a few cases, one of the early symptoms was flexion of the hip, which greatly assisted the diagnosis, and this sign usually appeared sooner or later. As the condition progressed, signs of septic absorption soon

became evident, with increasing tenderness and rigidity over the renal area.

After incision and drainage these cases rapidly improved, providing drainage was free and sustained until all traces of suppuration had ceased. This is important because the sinus is a relatively small track leading to a large connective tissue space around the kidney, hence burrowing of the pus is apt to occur, the tracks lighting up again on premature closure of the sinus; in two convalescent cases, in which the wound had healed, a second incision was necessary to permit of further evacuation of pus.

Rectal Conditions.

As one would expect from the tenesmus and engorgement of the bowel which accompany dysentery, complications affecting the rectum are common.

Hæmorrhoids were frequently attributed to an attack of dysentery, but probably in most cases they were already present, and the dysentery caused them to become painful or bleed, and so attracted the patient's attention to the condition. Certainly hæmorrhoids were among the commonest surgical ailments in Mesopotamia, and were particularly in evidence in the autumn after the summer ravages of dysentery.

A very distressing condition secondary to dysentery was prolapse of the rectum, due to continual straining, muscular relaxation secondary to debility, and loss of support to the anal muscles consequent on absorption of the fatty tissue in the ischio-rectal fossæ and pararectal tissues. Possibly prolapse was also encouraged by the trench type of latrine, in using which the man straddles across a ditch in a stooping posture.

A complete Whithead's operation was occasionally performed when prolapse was accompanied with severe hæmorrhoids, the combination being one of the very few conditions which were thoroughly worthy of a complete Whithead's operation.

The conditions referred to above were sufficient to impress forcibly upon one the many and varied surgical manifestations of the disease, and to cause one to reflect upon the enormous disability among troops, which is due, directly or indirectly, to the different forms of dysentery.

THE USE OF A HIGH FAT DIET IN THE TREATMENT OF DIABETES MELLITUS.¹

By L. H. NEWBURGH, M.D., and P. L. MARSH, M.D.

THE treatment of diabetes mellitus has been very greatly improved in the recent past, owing to the work of Allen and his colleagues. It has been shown by him that the urine of the severest diabetics can be made sugar free by sufficiently prolonged starvation and will remain free if the total energy intake is kept sufficiently small.

It has been the general custom to make up the diet largely of protein, because of the undoubted desirability of omitting carbohydrates, and because of the almost universal fear of precipitating a dangerous acidosis by allowing more than a mini-

¹ Abstracted from *Archives of Internal Medicine*, vol. xxvi, No. 6, December, 1920.

mum of fat. This high protein, low fat, carbohydrate diet, given in quantities sufficient to maintain metabolic needs, is accompanied by a glycosuria in the severe diabetics. In order to prevent glycosuria, it is necessary to restrict the total energy intake so much that inanition results. In other words, this leaves the physician the choice of one of two procedures. On the other hand, he may keep the patient sugar free, but in so doing, because of the low energy intake, he renders him unfit for the ordinary activities of life. On the other hand, if he aims to avoid this incapacity for his patient, he must expect him to continue to suffer from the effects of hyperglycæmia.

Having in mind the prevailing fear of the use of fat in the diet of diabetics we were very much surprised to find, when fat is used, as we used it in the management of our seventy-three cases, that such fear is entirely ungrounded. In no case did a serious acidosis develop. It is true that four of these seventy-three cases died in the hospital, but none of these deaths were due to our diet. One patient entered the hospital with influenzal pneumonia. Another one was transferred from the surgical clinic suffering from a severe sepsis accompanying suppurative mastoid disease. Both of these patients died within twenty-four hours after their admission to the medical service. The third patient came to the hospital in coma and died ten hours after admission. The fourth patient refused to limit herself to the diet, and went into coma after eating a bag of oranges brought by a relative. None of these fatalities can by any stretch of the imagination be attributed to the high fat diet. In no case did the much-feared fat produce any untoward symptoms. Not only was this true, but unexpectedly enough, acidoses, even though marked, existing at entrance, cleared up under our treatment.

Even though we are repeating, we feel it necessary to point out again that none of our patients whom we treated by means of our high fat diet developed a severe acidosis. It is true, on the contrary, that the evidence of acidosis progressively decreased day by day until it had invariably become negligible.

No diet can be considered adequate in the treatment of diabetes unless it will maintain nitrogen balance. Our diet is comparatively low in protein, and is open to the possible criticism that it contains insufficient nitrogen. It has been shown by several observers, and notably by Hindhede, that less than 0.66 gm. protein per kilogram of body weight, in the presence of sufficient calories from other sources, is more than enough to maintain nitrogen balance in healthy ordinarily active human beings. Our diet is constructed with this requirement in mind, and is so arranged that it contains at least 0.66 gm. protein per kilogram of body weight before the patient is discharged from the clinic.

But what is true for the normal man may not hold for the diabetic. It accordingly becomes necessary to determine the actual ratio between the nitrogen intake and nitrogen output of diabetics on our diet. This was done by the usual procedure.

The intake was computed from Atwater and Bryant's Food Tables, and the output in the urine and the stool was quantitatively determined by the Kjeldahl method.

A diabetic diet in order to be satisfactory must be capable of enabling the patient to lead a moderately active life for an indefinite period. As has already been pointed out, the severe diabetic may be kept sugar free by a sufficient reduction of his total caloric intake, but it is frequently necessary to reduce the total calories so much when protein is used as the chief source of energy that such patients suffer from slow starvation, and are quite incapable of earning a livelihood—indeed many of them may be said to merely exist. From the point of view of the patient, who does not fully appreciate the dangers of continued hyperglycæmia, such a situation is a poor exchange for that which he had before treatment. While our experience with the high fat diet has been brief in relation to the chronicity of the disease and we are not in a position to discuss the eventual results of our diet, we are, nevertheless, greatly impressed by the excellent condition of our patients' mouths after leaving the clinic. The strength and capacity for work of some of our younger patients is astonishing to one who has seen many severe diabetics treated by the older methods.

SUMMARY.

Patients with severe diabetes, as a class, do not remain sugar free on the usual high protein diet unless the total energy intake is kept so low that incapacity from starvation results. The only satisfactory diet is one which will keep the diabetic sugar free, which will prevent the occurrence of serious acidosis, which will maintain nitrogen balance and which will make it possible for him to resume the ordinary activities of life. With these four points in mind, we studied the effect of a high fat, low protein, low carbohydrate diet in the treatment of diabetes. Our experience with this type of diet in the management of seventy-three diabetics has convinced us that it is capable of fulfilling these four specifications.

Medical News.

Research Institute in Samoa.—The New Zealand Government has decided to erect modern research laboratories in Apia, and has appointed as pathologist Dr. Francis W. O'Connor, who some time ago was commissioned by the London School of Tropical Medicine to investigate filariasis in the Gilbert and Ellice Islands.

Pneumonic Plague in Chihli and Shantung.—Pneumonic plague made its appearance some months ago in a number of villages along the border between the provinces of Chihli and Shantung. The epidemic is being controlled by stopping all traffic through infected areas and the isolation of persons who have been stricken. Chihli is a famine district, where it is estimated that deaths from famine average from 300 to 1,000 daily.

Original Communications.

UNCLASSIFIED FEVERS IN JAMAICA.

By Major W. F. M. LOUGHNAN, M.C., L.R.C.P. and S.I.,
D.P.H., D.T.M. and H.Camb.

Royal Army Medical Corps.

ONE of the many difficulties met with in the tropics is the differentiation of unclassified fevers.

Through microscopic staining and improved cultural methods, the commonest pyrexias have been proved to be due to some bacterial or protozoal agent, still a large number of febriculae require further elucidation as to their cause.

In all tropical countries one meets with undefined and local fevers, the ætiology of which is unknown.

Many of these fevers are of short duration, and fortunately without any mortality, but whether they are due to a bacterium, a protozoon, a helminth, or some form of ultra-microscopic virus, is still a mystery to be solved.

The probability is that many of these fevers have some blood-sucking fly as a vector, and their cause is protozoal in origin.

In Jamaica, one sees at least three types of unclassified fevers: Type I: A fever closely resembling sand-fly fever, which is very common. Type II: A fever which may be regarded as an atypical dengue, which exhibits much variation in its signs and symptoms, which is fairly common. Type III: A fever which corresponds to Rogers' seven-day fever, which is rare.

Some of these fevers have been previously described as occurring in the West Indian Islands, under local names, such as Antilles fever and five days fever.

TYPE I.

The first type, or sand-fly fever like febricula, occurs in Europeans and non-Europeans.

It is most prevalent amongst new-comers under 30 years of age, it has no mortality, and frequently flares up into small local epidemics.

The incidence of the disease varies with the climatic conditions, and to some extent with the season of the year.

It has been observed most commonly at sea-level, but it is also present at higher altitudes.

Symptomatology.—The onset is sudden, but sometimes a history of a feeling of malaise for two or three days can be elicited.

Chilliness, headache, nausea, constipation and soreness about the eyes are present. Lumbar pains and a sensation of weakness or irregular pains in the lower extremities are complained of.

On examination, the face is found to be flushed, the conjunctivæ are injected, the temperature is elevated to 102° F. or 103° F. The pulse is slow and out of proportion to the degree of fever present.

Alimentary System.—The tongue is enlarged,

moist, somewhat flabby and coated with a whitish fur, except at the tip and edges.

The throat is sometimes hyperæmic, but soreness is rarely felt, and small vesicles are often seen on the buccal mucous membrane.

Nausea is often complained of, the appetite is lost, vomiting is rarely seen, constipation is generally present, and diarrhœa has been observed in a small proportion of cases.

Nervous System.—There is severe headache, which is generally frontal, the patients are invariably drowsy and dislike being disturbed, any movement or examination appears to greatly increase their discomfort, and there is a tendency to mental depression.

The eyeballs are tender on pressure; and movement, such as shutting or opening the eyes, causes some slight pain.

Vascular System.—The pulse is invariably slow and out of proportion to the degree of fever registered. Leucopenia is always present; the white cells vary from 3,800 to 5,400 per c.mm.

The polymorphonuclear cells are relatively diminished and the large mononuclear cells increased to as much as 14 per cent., and an average differential count shows:—

Polymorphonuclears ...	...	...	...	62	per cent.
Large mononuclears ...	...	...	...	14.5	"
Lymphocytes ...	...	...	...	22.5	"
Eosinophiles ...	...	...	...	1.5	"

Blood cultures give a negative result, and in the stained blood films no parasites are seen.

The hepatic and splenic areas are normal, the skin is comparatively dry, and erythemata have not been observed.

Respiration is slightly increased, and a mild bronchitis has been noticed in a few cases.

The urine is diminished in quantity, is dark in colour, and a trace of albumin may be present. Stiffness and pains in the back and loins, also calves of the legs, are frequently complained of, all of which are aggravated on movement.

The Temperature.—On the evening of the first day's fever, a temperature of 104° F. may be reached; it remains elevated from eighteen to twenty-four hours, and falls by lysis on the third and fourth day.

Frequently the fever is prolonged to the fifth or sixth day, but for the last forty-eight hours of the ailment the temperature is not raised more than a degree or less above normal.

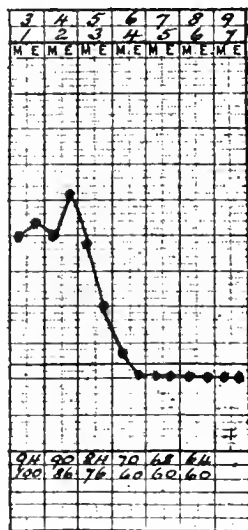
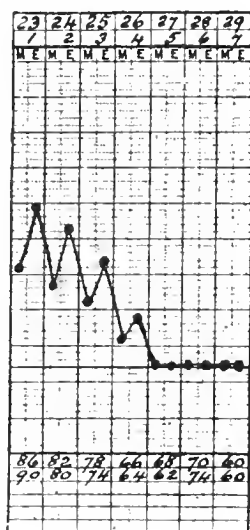
Two temperature charts are here shown.

Differential Diagnosis.

The fever has to be differentiated from enteric fever, in inoculated patients, from paratyphoid in its early stages, from malaria, dengue, Malta fever, typhus and influenza.

To recapitulate, the following signs and symptoms are indicative of the fever:—

(1) Absence of rigors, paroxysms of fever and marked sweating.



(2) The injected condition of the conjunctivæ.

(3) The slow pulse, which bears no relation to the degree of fever present.

(4) The absence of parasites from the blood, associated with a leucopenia and an increase of the large mononuclear cells.

Insect bites may appear as urticarial spots, very itchy, about 1 cm. in diameter, as raised burning papules, or as small hyperæmic areas, surrounded by minute ecchymoses, which disappear in eighteen to twenty-four hours after the bite.

The incidence of the fever varies from year to year, and still more so with the advent of newcomers or non-immunes, when there is a distinct increase in the number of cases.

From a study of nine cases the incubation period would appear to be within seven days, as five of these developed the disease on the seventh day after landing on the island, three on the fifth day, and one on the sixth day.

Although the pyrexia has a striking resemblance to sand-fly fever, it is impossible to establish a diagnosis of that fever, as the blood-sucking phlebotomus has never yet been found in Jamaica, therefore one has to consider if pappataci fever could have some other fly as a vector, such as a mosquito, *Culicoides* or simulum.

There are six known anopheline mosquitoes in Jamaica, numerous species of *Culex*, and *Stegomyia* are also found throughout the island.

Culicoides maculithorax is the most common blood-sucking insect on the island and may be a vector of the disease; it is ubiquitous in its habits.

Simulium has been found on the island, but has not been captured where the fever is prevalent.

TYPE II.

The second type of fever which may be regarded as an atypical dengue shows much variation of the signs and symptoms in the individual cases affected.

In my experience, true dengue varies considerably in each epidemic, and the classical signs of that disease are not constant in this fever, which is endemic in Jamaica, and has many affinities to true dengue.

I can only speak from an experience of thirty-six cases.

Symptomatology.—The onset is sudden, associated with severe headache. Patients state they felt perfectly well when rising in the morning, and have been able to enjoy a good morning meal, but later, when proceeding to their work, they complained of a feeling of chilliness, slight shivering and flushing about the face. In some cases a history of anorexia and malaise of two days' duration was elicited.

Alimentary System.—There is a loss of appetite, the mucous membrane of the mouth and throat is congested, but not sore.

The tongue is moist and covered with a creamy white fur, and sometimes red papillæ are seen on the dorsum.

Nausea is seldom felt and vomiting appears to be exceptional. Constipation is nearly always present, and diarrhœa is uncommon.

Nervous System.—Headache is constantly present, which may be frontal or occipital, and patients frequently refer the pain to the back of the eyes. The degree of pain varies very much, in some cases it is intense, while in others it is very slight.

Severe joint pains are most uncommon. A diffuse lumbar pain with indefinite aches in the joints and limbs are the most common conditions met with.

Delirium has not been noticed, but mental irritability is sometimes observed.

Depression is often seen during the last days of the fever, and for some time during convalescence.

It is associated with loss of power of concentration and defective memory.

Cardiac and Respiratory Symptoms.—The pulse-rate is generally increased and in proportion to the degree of fever present.

A slow pulse has been recorded during the period of lysis.

The respiratory movements are unaltered. A bronchial catarrh has been observed in two cases.

The Blood.—Leucopenia is the rule, which increases from day to day during the fever.

The decrease affects all the white cells except the large mononuclears and transitional forms.

The lymphocytes were the first to increase after the temperature became normal.

The Skin Symptoms.—The rashes are divided into primary and terminal. The primary rash is not a prominent feature of this disease; it may be absent or so slight as to be overlooked.

It varies from a flushed appearance of the upper extremities (but chiefly involving the head and neck) to a well-marked erythema, which coincides with the onset of the fever.

A form of erythema met with during the onset of the pyrexia deserves some special notice.

It is of a brilliant red colour, somewhat erysipelatous in character and very similar to the "Rashe Astacoide" of the French writers, which is sometimes seen as a prodromal condition in small-pox.

The secondary rash shows much variation as to the day of its first appearance, its distribution, duration and general character.

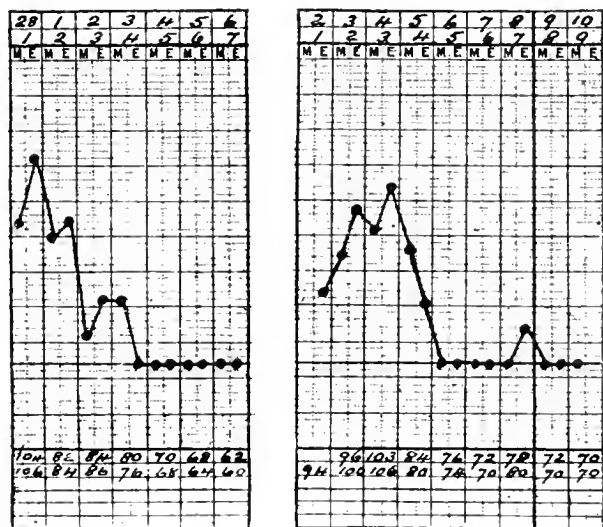
It may be morbilliform, scarlatiniform, or urticarial. It is commonly first seen about the head, neck or dorsal aspect of the fingers, and spreads from the upper part of the trunk downwards.

It first appears on the third or fourth day of the fever, and may last for as long as six days.

The rash begins to disappear when the temperature falls; it takes three to four days before the skin is completely free from all signs of the eruption. Desquamation does not occur, but itching is not uncommon.

The Temperature.—The temperature is elevated from three to five days; it falls by lysis. A secondary fever is unusual, but a rise of temperature is sometimes noticed for one day during convalescence, two to five days after the fall of the primary fever.

Two temperature charts are here shown.



Differential Diagnosis.—The fever has to be differentiated from influenza, yellow fever, sand fly fever, enteric or paratyphoid, scarlatina, measles, early small-pox and rheumatic fever.

Dengue has been known to be epidemic in the West Indies for many years. The disease is supposed to have been first imported to Spain from these islands about 1783.

Very few records are available with reference to the prevailing and unclassified fevers of the Island of Jamaica.

In an old official reference book of the Island of Jamaica for 1827, I found the following note

amongst the historical and remarkable events:—
"A rheumatic fever, called 'Dando,' with pains in the joints, raged in the island. It was not attended with any serious consequences; the pain lasted for three or four days. It was also prevalent at the time in all the West Indian colonies and in Europe."

A widespread epidemic of dengue was reported from Galveston during the autumn and early winter months of 1918.

In this particular epidemic the disease is supposed to have been imported from the West Indies. Dengue was prevalent in epidemic form in Cuba from August to November, 1920.

TYPE III.

The third type of fever is well known in oriental countries, where its prevalence on the Indian and Arabian littoral has long been recognized.

It is commonly known in the East as seven-day fever, and has been well differentiated by Rogers.

General Condition at Onset.—The onset is generally sudden, the patient complaining of a feeling of chilliness, associated with a mild rigor and dull pains in the back, the face and neck are flushed, and the conjunctivæ somewhat injected.

The development of the fever is sometimes insidious, simulating enteric fever, more particularly the paratyphoid A group, and enteric fever in people who have been artificially immunized by vaccination against enteric fever.

Digestive System.—The appetite is completely lost, the tongue is coated centrally with a thick creamy fur, the tip and margins are clean, a slight sore throat is often present.

At the onset of the fever the patient may vomit, but this is a rare occurrence; the abdomen is somewhat distended.

The liver is slightly tender, the spleen is sometimes felt. Constipation is generally present.

Circulatory System.—The heart shows nothing to note, the pulse-rate is in co-relation with the temperature for the first forty-eight hours, and is often full and bounding, after which the rate is diminished.

Bradycardia is present at the end of the fever and during the early days of convalescence.

Respiratory System.—The respiratory system does not appear to be affected, a mild basal bronchitis may be present, and respiration is slightly increased for the first forty-eight hours.

The Blood.—The examination of the blood shows nothing pathognomonic of the fever. The red cells are slightly decreased in number.

A differential count shows the polymorphonuclear cells reduced, while the large mononuclears (and to a lesser extent the lymphocytes) were relatively increased.

The blood examination shows much variation.

The Cutaneous System.—The skin is smooth, sweating, and no rashes have been seen.

Nervous System.—Patients suffering from "seven-day fever" invariably have a severe

frontal headache, and frequently complain of dull pains in the back.

In the enteric-like cases the intellectual functions are somewhat dull.

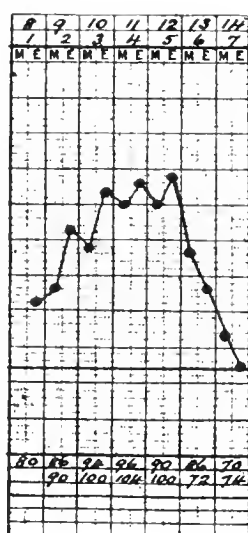
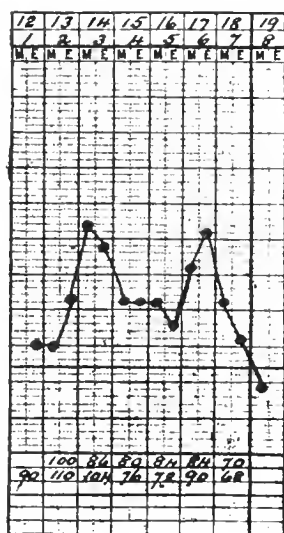
Urinary System.—Examination of the urine shows nothing to note; a trace of albumin is occasionally present.

The Temperature.—The duration of the fever in this disease varies considerably. In the majority of cases the fever lasts from six to seven days, but may be slightly longer.

The fever may be continued or remittent, and is occasionally intermittent in type.

The most characteristic temperature is the saddle-back fever curve. It shows a primary rise and a gradual fall which lasts about three days. After this the temperature remains steady for about two days, and is followed by a terminal rise and fall which occupies another two days.

Two temperature charts are here shown.



Ætiology.—Rogers has isolated a coli-like organism from the blood of patients suffering from this fever.

More recent Japanese workers have isolated a spirochæte from cases of seven-day fever.

ACUTE BACILLARY DYSENTERY.

By NATHANIEL CRICHLAW, M.B., Ch.B. Glasgow.

Government Medical Officer, British Solomon Islands.

DYSENTERY can be defined as an inflammation of the large intestine caused by a specific germ and characterized by the passage of blood and mucus in the stools.

ÆTIOLOGY.

There are two main types of dysentery, depending upon the causative agent, viz. (1) the "amœbic" and (2) the "bacillary."

Amœbic dysentery is caused by the *Entamœba histolytica*.

This type has a tendency to chronicity and frequently gives rise to hepatitis and liver abscess.

Bacillary dysentery is caused by a variety of bacilli distinguished from one another by fermentation and serological reactions. The two chief groups of bacilli are the *Bacillus dysenteriae* of Shiga group and the *B. dysenteriae* of Flexner group.

The means of infection are by the drinking water, flies, uncleanly habits, infected privies, fouled vegetables, dust and vessels used by dysenteric patients.

The predisposing causes are diet, constipation and diarrhoea, exposure to cold or wet, malaria or any other fever and sickness that tends to reduce the bodily health, overcrowding and general carelessness in regard to sanitation.

Curious notions exist amongst the natives and others with regard to the causation and means of infection of dysentery. The eating of fish and pineapples has been attributed to be among the causes. And the natives hold that dysentery is prevalent during the crab season.

Major L. Cook, of the Indian Medical Service, in a very interesting paper on "The Cause of Dysentery," and published in the *Indian Medical Gazette* of March, 1921, advances some interesting and original views with reference to the causation of dysentery. He asserts that it has not been definitely proved that the *E. histolytica* and the *B. dysenteriae* are the causal agents. He places more emphasis upon the predisposing causes, such as changes in the weather, heat, a sedentary life, alcohol and diet, and considers these as the real exciting and principal causes of dysentery, whereas the amœba and the bacillus are the result and not the cause of the disease. These "predisposing" causes lead to an unhealthy mucous membrane, and the amœba and the bacillus are changed from saprophytic to pathogenic organisms.

There are two conditions which are necessary to produce an alteration in the healthy mucous membrane of the intestine:—

- (1) An alteration in the normal action or interaction of the secretions flowing into the intestine.
- (2) An alteration in the circulating fluids in the walls of the intestine.

He infers that there is a defect in certain essentials in the dietary which lowers the resisting power of the walls of the intestine and allows saprophytic organisms to become pathogenic.

According to him, insanitary conditions leading to a fly pest are not essential to an outbreak of dysentery.

He holds the view that the so-called bacillary dysentery is only a severe form of dysentery as compared with the amœbic type.

I agree with Major Cook that enough emphasis has not been placed upon the predisposing causes, but I do not agree with him in his view of flies. These certainly spread the disease and are responsible in causing and maintaining epidemics.

The prevailing Type of Dysentery in the British Solomon Islands.

The type of dysentery prevalent in the British Solomon Islands is the "bacillary" type. This has not been proved bacteriologically, but the fact that liver abscess is unknown, chronic dysentery rare, and emetine beneficial in very few cases, goes to prove that amœbic dysentery must be very uncommon.

Dysentery is the great scourge amongst the natives, and is responsible for most of the deaths amongst them. Epidemics of this disease occur in cycles, and every epidemic leaves its sad toll of deaths amongst the natives and materially reduces the population. Whole villages are sometimes wiped out in epidemics.

The last dangerous and widespread epidemic was in 1915. During this year amongst plantation labourers there were seventy-one deaths from dysentery out of a total of 119 deaths. In this year (1915) the admissions to the Government hospital totalled 185, of which 131 were dysenteric cases. There were twenty-one deaths among these dysenteric cases.

The natives are for the most part left untreated, except those in the neighbourhood of Government and Mission stations.

At present I am the only Government medical officer for the whole of this Protectorate, which contains a population of 100,000 natives and 600 Europeans and non-natives. Beside myself, there is a medical missionary.

SYMPTOMATOLOGY.

The onset in acute bacillary dysentery is generally sudden. The patient first complains of gripping abdominal pains, diarrhœa and fever. Blood and mucus are then passed in the stools, which become less fœulent, scanty, and latterly consist of mucus and blood only. The quantity of blood varies from a mere streak in the mucus to pure blood. In some cases the stools are of a dark green colour mixed with blood and mucus and very offensive smelling.

When the ulcers begin to heal epithelial flakes are seen in the stools. The number of stools varies from six to forty-eight within twenty-four hours.

There are gripping pains in the abdomen, a continuous desire to stool and tenesmus.

The features assume a pinched and anxious expression.

The tongue is coated with a white fur.

There is nausea and vomiting in some cases.

There is generally a rise in temperature at the beginning of the attack. The temperature is of a remittent character during the acute stage.

The pulse is rapid.

There may be collapse and death.

Death in dysentery is generally due to heart failure or exhaustion.

Differentiation of the Bacillary Type of Dysentery from the Amœbic.

It is stated that these two types can be differentiated by means of the symptoms and the characters of the stools.

The marks of difference are said to be as follows:—

<i>Bacillary</i>	<i>Amœbic</i>
Onset sudden	Onset gradual as a rule
Development acute	Tendency to be chronic
Temperature high	Little or no temperature
Less blood present in the stools	More blood present in the stools
Stools consist of mucus streaked with blood	Stools consist of rosy blood-stained mucus
Reacts to polyvalent serum, but does not react to ippecacuanha	Reacts to ippecacuanha

No reliance should be placed upon these marks of differentiation, as one type of dysentery may simulate the other.

PROGNOSIS.

Of prognostic value are (1) the quantity of blood present in the stools; (2) the number of stools passed in twenty-four hours; (3) vomiting; (4) the temperature—a persistently high or a subnormal temperature is bad; (5) the age of the patient.

TREATMENT.

There are three modes of treating bacillary dysentery, viz.: (1) by serum; (2) by saline aperients; (3) by saline aperients with serum or with intestinal disinfectants.

The combined serum and saline treatment seems to be the most successful form of treatment.

Good results have also been obtained from the combined saline and intestinal disinfectant treatment.

In the British Solomon Islands the serum therapy cannot be adopted for the reason that it is difficult to keep the serum, and that serum cannot always be obtained from the nearest market, viz., Australia. One has to rely upon the saline treatment.

I took charge of the Government Hospital, Tulagi, two years ago. I was dissatisfied with the results obtained from the purely saline treatment and from the combined saline and intestinal disinfectant treatment. I therefore, after some experimenting, evolved the following lines of treatment, which has proved most successful.

Lines of Treatment.

(1) *Rest*.—The patient is kept in bed and uses a bedpan if possible.

(2) *Diet*.—The diet consists of milk, rice water, barley water, albumen water and whey during the acute stage. Afterwards, arrowroot, cornflour, sago, beef or chicken broth, milk custards and soft boiled rice are given when the blood and mucus are absent from the stools.

(3) *Drugs*.—On admission, 1 oz. of castor oil and

20 minims of tinct. opii or tinct. chlorof. et morph. co. are given.

On the following day the following mixtures are administered:—

Bismuth salicylate	...	...	...	...	5 grains
Pulv. ipecac. co.	...	...	...	...	3 "
Calomel	...	...	...	...	$\frac{1}{4}$ grain

To be mixed and made into a powder. Dose: Two to four powders every four hours.

These powders are followed by a saline aperient— $\frac{1}{2}$ oz. mag. sulph. or 1 dr. sodium sulphate—every morning, and are administered daily until the blood and mucus disappear from the stools.

If these powders are administered for too long a period mercuric poisoning may develop. But generally the blood and mucus disappear from the stools within a week. If the case is taken at the beginning of the attack the dysenteric symptoms may be checked within two days. The above powders are made up in tablet form by Messrs. Elliott Bros., Ltd., of Australia, for me, and are labelled "Anti-dysenteric tablets A."

When the blood and mucus have stopped the following powder is then given:—

Bismuth salicylate	...	...	...	...	5 grains
Salol	...	...	...	...	5 "

To be mixed and made into a powder. Dose: Two to four powders three or four times a day.

These powders are given for at least a week. As constipation is very apt to result, the bowels are kept opened by a mild aperient.

These powders are made up in tablet form by Messrs. Elliott Bros., Ltd., and are labelled "Anti-dysenteric tablets B."

EMETINE.

In conjunction with the above treatment, emetine is sometimes administered. A third of a grain of emetine hydrochloride is administered hypodermically night and morning for two consecutive days. In very few cases is there any improvement noticed from these injections of emetine. In some cases it had the effect of making the cases worse. It used to be administered as a routine by me, but I only use it now in certain cases of dysentery.

Rectal Injections.—Rectal injections are found useful, and whenever possible are resorted to.

The solutions used are weak potassium permanganate solution, Condy's fluid, weak boracic acid solution, 20 per cent. of glycothymoline or salino solution.

The solution is injected into the bowels by means of an apparatus consisting of a rubber catheter, rubber tubing and glass funnel. One to two pints of the solution warmed to a temperature of 100° F. is allowed to run into the bowels. Then 5oz. to 10 oz. of saline solution is injected into the bowels and retained by the patient.

Brandy.— $\frac{1}{2}$ oz. of brandy in milk or warm water is given if the patient is weak and in a

collapsed condition. This dose is repeated every four hours.

Sleeplessness.—If the patient is unable to sleep, 20 to 30 minims of tinct. chlorof. et morph. co. is given in $\frac{1}{2}$ oz. of brandy. Morphia and atropine are sometimes injected hypodermically.

Abdominal Pain.—For the relief of abdominal pain, the above is given or hot fomentations to the abdomen.

Convalescence.—The patient is gradually put on his normal diet, and a tonic containing iron and arsenic is given.

MORTALITY.

The mortality given for acute bacillary dysentery varies from 10 per cent. to 40 per cent.

The above lines of treatment were adopted by me in the latter half of 1919. Previous to then the treatment used was the saline treatment.

The mortality from dysentery at the Government Hospital, Tulagi, for the past four years are as follows:—

	Number of cases treated	Deaths	Per cent.
1917	54	10	18.5
1918	52	8	15.4
1919	69	8	11.6
1920	88	8	9.1

Many of the dysenteric cases that were admitted into hospital were hopeless from the beginning, as they were kept far too long until the disease had gained a strong foothold. Many had the disease as long as a fortnight without being treated.

In 1920 three cases died within twenty-four hours of admission. The prisoners at Tulagi supply 50 per cent. of the dysenteric cases. Very few deaths occur among them for the reason that the cases are obtained early and treated. The mortality among the prisoners from dysentery for the past four years is as follows:—

	Number of cases treated	Deaths	Per cent.
1917	27	2	7.4
1918	23	3	13
1919	28	1	3.6
1920	39	1	2.6

Thus the prisoners on Tulagi supply the real criterion for the above lines of treatment.

REFERENCES.

- CASTELLANI AND CHALMERS' "Manual of Tropical Medicine."
MANSON'S "Tropical Diseases."
ROGERS' "Dysenteries."
CRICHTON'S "Brief Medical Guide for the Solomon Islands."
Indian Medical Gazette, March, 1921.

BRIEF NOTE ON THE TREATMENT OF TINEA IMBRICATA.

By O. G. F. LUHN, M.A., M.B., D.P.H.

MOST of the text-book remedies were not found satisfactory, and all failed to establish a cure. The following other formulæ were tried: An

aqueous solution containing 1 per cent. bleaching powder and 1 per cent. caustic soda. This was cheap and removed the scales, but could not be considered a cure. A mixture of acid salicylic, 4 oz., glacial acetic acid, 4 oz., and methylated spirits, 36 oz., however, proved very efficient. The SO_2 vapour bath was also tried. It gives relief from the itching after the first use. After seven baths one patient went away believing himself cured. The profuse perspiration accounts for a good deal of the improvement.

Von Recklinghausen's Disease in the Negro (R. S. Weiss, *Arch. Dermat. and Syph.*, February, 1921).—The author describes two cases of this disease, one of a negress, in which hyperpigmentation, fibromata and low mentality were united; and the second of a negro, who showed fibromata and pronounced spinal curvature. The author suggests that this curvature should be regarded as one of the usual symptoms, as it is found in the majority of cases of the disease.

Distribution of the Spores of Bacillus botulinus in Nature (K. F. Meyer, *United States Public Health Reports*, January, 1921).—Dickson and Burke have reported the finding of spores on bird-pecked, bruised and moulded cherries, and the tests made by the author demonstrated the organisms on bird-pecked apricots, cherries and unbroken olives on the tree. The laboratory results can well be correlated with some of the epidemiological observations. In sixteen outbreaks the goods used for home canning were purchases in the open market. Among the fruits and vegetables which apparently carried *B. botulinus* spores are to be mentioned pears (one outbreak), beans (seven outbreaks), asparagus (five outbreaks), and apricots (three outbreaks).

The author states in conclusion that the information thus far at hand definitely indicates that the spores of *B. botulinus* may be widely distributed in nature in certain localities, and that they may be on vegetables or fruits when they are picked or bought in the open market. It is also quite obvious that under these circumstances protection against botulism can be achieved only by sterilization of the food product to be preserved at a temperature above boiling (under pressure) or by cooking the contaminated food before eating, or even better, by discarding any canned vegetable or fruit which shows the least sign of spoilage.

FOLLOWING plague deaths reported from places outside Bombay Presidency and Sind in April last: Madras Presidency, 101; Calcutta, 118; Bengal, excluding Calcutta, 7; United Provinces, 3,140; Punjab, 3,869; Burma, 359; Bihar and Orissa, 2,265; Central Provinces, 299; Hyderabad State, 83; Mysore State, 137; Central India, 134; Rajputana and Ajmer-Merwara, 17. No plague reported elsewhere.

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THE JOURNAL OF Tropical Medicine and Hygiene

AUGUST 1, 1921.

A PRESENTATION TO PROFESSOR W. J. R. SIMPSON, C.M.G., AND SIR JAMES CANTLIE, K.B.E.

AN interesting ceremony was held, on the afternoon of July 15, 1921, at the London School of Tropical Medicine. The occasion was none other

than the retirement of Professor W. J. R. Simpson, C.M.G., M.A., M.D., D.P.H., F.R.C.P., from the lectureship of Tropical Hygiene and Sanitation, and of Sir James Cantlie, K.B.E., M.A., M.B., F.R.C.S., L.L.D., D.P.H., Lecturer on Surgery to the School. The occasion was celebrated by the presentation of a silver salver to each with a suitable inscription from their fellow-lecturers in the School.

There is always a touch of sentiment afoot, something akin to sorrow when senior teachers of any school say good-bye to colleagues, but on the present occasion there were several relationships in regard to this retirement which rendered it of some interest both from a historical as well as from personal points of view.

In the first place, both Simpson and Cantlie were members of the original staff of the School when it was opened in October, 1899. The other lecturers were Sir Patrick Manson, G.C.M.G.; Dr. C. W. Daniels, M.B., F.R.C.P.; Dr. Fleming Mant Sandwith, C.M.G., F.R.C.P.; Professor R. T. Hewlett, M.D., F.R.C.P.; Dr. Louis Sambon.

Of these all except Dr. Sandwith are alive, but only Professor Hewlett and Dr. Sambon are still on the active staff.

As the ceremony was connected with the London School of Tropical Medicine, the conception, birth and development of the School was the natural theme referred to by the several speakers. Dr. Newham, the Warden of the School, was the spokesman on the occasion, and, on behalf of his colleagues, in graceful, kind and complimentary sentences paid a tribute to the two veterans who had done so much to advance the interests of the School of Tropical Medicine generally. The pioneers, who undertook the teaching of tropical medicine in 1899, raised no question or quibble about payment for their services. Enough for them that a great cause was being advanced; that they were taking part not at the opening of a new institution of conventional type, but instead, although the environment was unattractive—a reclaimed piece of Thames mud from the most easterly point of London; the building, humble in all conscience, unpretentious and homely—here was being created a new era in medicine, where the causes of the diseases of mankind were about to be hunted to their lairs. The signs and symptoms of diseases had been described by masters of oratory and scribes of fame, but the new revelation was to be made by a closer study of nature along lines hitherto neglected and paths wholly untrodden. What band of men at the threshold of so glorious an enterprise with a future of so unbounded a horizon and imbued with the true spirit of scientific sincerity would hesitate for a moment to consider payment for their services? They entered upon their life's work without bargaining or stipulation. They cast their bread upon the waters, and truly it has returned to them after many days. That was the early spirit of the pioneers of tropical medicine, led by that giant of scientific research, Sir Patrick

Manson, G.C.M.G., F.R.S. Sir James Cantlie in his speech referred to his own personal touch with the great man. It was when Manson was in Hong-Kong in the year 1887 that a letter was sent to Dr. Mitchell Bruce, London, a college friend of Sir Patrick's, telling him that he was intending to retire from the East, and that he wished for a successor to be recommended to him, but that he did not wish his name to be mentioned in the matter. Dr. Bruce called in his friend, Mr. Cantlie, to help him select a suitable man, but without mentioning either name or place. After a long sidelong they failed to agree upon a man, and gave it up as well-nigh hopeless. At the end of the discussion Cantlie said: "Well, I have been for seventeen years teaching anatomy, and some of my pupils are driving about in their carriages, I don't see why I should not go to this place, wherever it is. Where is it?" Bruce answered: "I must not tell you that." "But I can't be expected to say I will go without knowing where it is. Well, let us consider it must be on the earth, not in Mars. If it is in the Western Hemisphere, I am not going." "It is not in any of the Americas." "If it is in India, Australia, New Zealand, or the Cape, I am not going." "It is in none of these." "Then it must be Mackie's practice in Alexandria or Manson's practice in Hong-Kong." "It is not Mackie's practice." "Then it is Manson's practice in Hong-Kong, and I'm going." Within half an hour after consultation with his wife a telegram was despatched to Hong-Kong, which read: "Will Cantlie do?" Next day came back the reply: "Yes," and duly after resigning a surgeoncy to a London hospital and a lectureship on anatomy to a London school, these two men met, never having seen each other before, on the wharf at Hong-Kong. What was the payment? The matter had never yet been raised, and it was only settled some time after arrival. Sir James says he has now occasionally to select professors for the different chairs in the Hong-Kong University. The first question almost invariably is the payment. That, he says, tends to prejudice him against the applicant straight away; this is, of course, quite wrong. But here is a young man about to be sent out to a new and endowed university, giving scope for work along new lines with an illimitable outlook for success. The 400,000,000 of Chinese are asking for instruction in Western knowledge, medicine most pointedly of all. The success of the new university is what these young teachers from this country make it; enthusiasm is the keynote of success; on that the attraction of the university depends, the income of the institution will increase or diminish according to the ability and enthusiasm of the instructors. Having their pound of flesh is a dead spirit under such circumstances, and those thus minded for their own sakes and the sake of the school they are proposing to serve had better stay away. That was not the spirit that for twenty years kept the College of Medicine for Chinese going, started by Sir James

Cantlie in 1887, and of which Sir Patrick Manson was the first Dean. The teachers in this college without payment for twelve years, devotedly taught the different departments of medical education, their reward being to see the University of Hong-Kong raise its wonderful architectural front to face the Continent of China, and proclaim to the world that Britain had sent not warships and great guns, but science and peace to the listening shores of that great country.

Dr. Simpson states that he was present at a meeting in the South Kensington Museum in 1898, when at a conference, with Sir Joseph Fayrer, Bart., in the chair, he listened to a paper by Sir James Cantlie on a tropical medicine school for Britain for the first time. This, as we know, came into being under the stimulus of Sir Patrick Manson and with the advice and financial Government help from Mr. Joseph Chamberlain, then His Majesty's Secretary of State for the Colonies.

The school was opened in October, 1899, at which a paper by Sir Patrick Manson was read (curiously enough by Sir James Cantlie) as an introduction.

Dr. Simpson and Sir James Cantlie together issued the *Journal of Tropical Medicine* in 1898, which has continued until the present day, and will probably do so for many a day to come. During the time of these two pioneers of tropical medicine we associate the initiation of the Royal Society of Tropical Medicine and Hygiene. Professor Simpson has just finished his allotted period of two years as President, and Sir James Cantlie has succeeded him. The Society was started by the latter at a meeting called at his own home, and later at the Colonial Office. "We are parting, therefore," Dr. Newham remarked, "with two of the pioneers who have founded our several institutions and societies appertaining to tropical medicine, and whilst wishing them many years to live to witness the infant establishments largely due to their initiation fulfilling their purposes, we promise them that we their successors will carry on the work to the best of our ability in memory of their great example, and with a firm resolve that the cause they so wisely upheld shall have a glorious future."

Amongst those who took part in the proceedings were: Colonel Alcock, C.B., F.R.S.; Dr. Aldo Castellani, C.M.G.; Dr. C. W. Daniels, M.R.C.P.; R. H. Elliot, C.B.E. D.S.O., F.R.C.S.; Dr. R. Tanner Hewlett, F.R.C.P.; Dr. G. C. Low, M.R.C.P.; Sir Patrick Manson, G.C.M.G., F.R.S.; Dr. P. Manson-Bahr, D.S.O., M.R.C.P.; Dr. H. Newham, C.M.G., M.R.C.P.; Colonel J. J. Pratt, F.R.C.S.; Dr. Andrew Robertson; Dr. J. Gordon Thomson; Dr T. H. Vaughan.

A. C.

Abstracts and Reprints.

AINHUM, A FAMILY DISEASE.¹

By K. M. B. SIMON, M.B., D.P.H.

AINHUM is fairly common in British Honduras. It has been described as a chronic dystrophy of the fifth or fourth toe in native races, characterized by the formation of a furrow at the digitoplantar fold. This fibrosis extends, injuring the vessels, and producing the endarteritis obliterans and rarefying osteitis. I have noticed a similar dystrophy in the little finger of an Indian. That the disease is inherited is proved by the fact that the father and brother of the patient, the condition of whose foot is at present under examination, suffered from the same condition, all ending in the loss of the toe. The cause of this disease is unknown, but the theories that it is due to leprosy or self-mutilation are untenable. The condition resembles ground-itch, except that in ground-itch there is ulceration under every toe; in ainhum, under only one toe.

The treatment consists of an incision longitudinally into the constricting band, allowing re-establishment of the circulation.

IMMEDIATE SURGICAL COMPLICATIONS OF DYSENTERY.¹

By BASIL HUGHES, D.S.O., M.A., M.B., B.Ch.Camb.,
B.Sc.Lond., F.R.C.S.,

AND

H. STANLEY BANKS, M.A., M.B., Ch.B.Glas., D.P.H.Camb

THE immediate complications of dysentery may be given in a comprehensive way as:—

- A.—Acute hepatitis.
- B.—Acute liver abscess.
- C.—Perforation of the colon (gangrenous colitis).
- D.—Gangrenous proctitis.
- E.—Synovitis with effusion into the larger joints.

A and B are due to infection by *E. histolytica*, and, amœba having been found in the portal capillaries, this may well be the path by which it reaches the liver from the intestine. C and D are due either to infection by amœba or bacilli, plus a secondary infection with intestinal organisms. E is a complication of bacillary dysentery only.

A.—*Acute Hepatitis*.—Acute hepatitis is often difficult to diagnose from liver abscess. After a period of malaise the liver is found to be enlarged and tender. Pyrexia is present, but is not so remittent as in liver abscess. Evening temperature may reach 103° F. Leucocytosis is generally present, varying from 10,000 to 20,000 per c.mm. The patient is sallow and the conjunctivæ are icteroid.

¹ Abstracted from the *Journ. Amer. Med. Assoc.*, vol. lxxvi, No. 9, February, 1921.

¹ Abstracted from *British Medical Journal*, No. 3129, 1920.

One of us (B. H.) operated on two cases of acute amoebic hepatitis in which liver abscess had been diagnosed. In both the enlarged liver represented the same very characteristic appearance, the colour resembling that of a ripe damson. An exploratory needle thrust into the organ failed to find pus, and a syringeful of blood was withdrawn.

In case of doubt as to the diagnosis, we think it justifiable to give the patient a course of emetine before undertaking any operation. If the condition be one of pure amoebic hepatitis, improvement will show itself within three or four days, and the whole of the symptoms will soon subside.

B.—Acute Liver Abscess.—This is a very serious condition, because the abscesses are so often multiple. Acute liver abscesses, as we saw them, differed somewhat from text-book descriptions. An exploratory puncture with the needle in the sites recommended was useless, and in no case were we able to withdraw any of the abscess contents, since the pus was too thick to be drawn into the syringe. Successful aspiration of the contents of these abscesses has been reported from China, but we are informed that the instrument used there resembles what we employ for removing the core from an apple.

The most common site for liver abscess is the upper and posterior aspect of the right lobe, although, as mentioned before, secondary abscesses often exist. The left lobe, though not a common site, is not exempt.

Most noticeable in our cases that came to autopsy was the extreme destruction of the liver tissue—a destruction not confined to the abscess cavity only. Immediately adjacent to the main abscess cavity was a zone of ragged and destroyed liver substance; next to this was a zone of acutely inflamed liver tissue, and again outside this was a zone of liver tissue that had undergone extreme fatty degeneration. The remainder of the liver substance was in a state of acute hepatitis, and resembled that already mentioned.

The symptoms of acute liver abscess are fairly definite. The liver is enlarged and tender, the liver dullness may extend high up on the right side behind, and friction sounds may be heard at the right base; there may also be some fluid in the right pleural cavity. These last two signs are important. Pyrexia is present, the temperature reaching 103° F. and remitting. Leucocytosis from 10,000 to 20,000 is almost invariable, and the patient presents both an icteroid tinge and a characteristic facies. There may be, but often there is not, a previous history of diarrhoea with blood and mucus in the stools. When the negative history was given in our Salonica cases it was usually found that the patient had been in Egypt (where *E. histolytica* infection is rife).

The treatment that gave the best results was an anterior incision about two inches in length through the right rectus muscle. The liver was exposed and packed off with dry sterile gauze from the general peritoneal cavity. A long pair of sinus forceps was

introduced into the right lobe in an upward and backward direction, and it was speedily felt to enter the main abscess cavity. The thick contents, which resembled anchovy sauce, were evacuated, and a large tube was introduced. The patient was nursed in the sitting position, and drainage by these means was excellent. Into the abscess cavity through the tube was introduced quinine bihydrochloride three times daily, and the patient was lowered for half an hour to prevent its immediate escape. In addition emetine (1 gr.) was administered hypodermically daily for the first ten days. At first we instilled eusol through Carrel's tube placed inside the large drainage tube. This was not successful, the liver being found post mortem to be acutely autolysed. Twort has shown that eusol inhibits the movements of *E. histolytica* but does not kill it. The quinine solution, on the other hand, has an excellent effect. In making the daily dressings the strictest aseptic precautions should be observed. We found the track very apt to become infected with anaerobic bacilli, although we saw no actual gangrene.

In none of our cases did we employ the trans-pleural route for approaching and draining the abscess, because in the experience of our colleagues this route, in the case of acute abscess, did not give satisfaction. Out of nine cases operated upon by one of us (B. H.) there were five recoveries and four deaths. The prognosis was good so long as the abscess was single and was thoroughly evacuated and treated by quinine solution locally and emetine administered hypodermically. All such cases recovered. In cases of multiple abscess with very great destruction of liver tissue, and also in cases complicated by severe recurrent malaria, the prognosis was very bad.

C.—Perforation of the Colon: Gangrenous Colitis.—This complication was notoriously fatal; it presented symptoms and pathological changes that were wholly new to us, and afforded ground for speculation. The usual history was as follows:—

A patient, apparently convalescing satisfactorily from a chronic recurrent dysentery, exhibits abdominal distension. The pulse remains good, the patient is conscious and not apparently distressed. Within a very short time, often a few hours from this period, the pulse becomes rapid and thready. The patient breaks out into a cold perspiration, and dies within a few hours or so.

Operation was undertaken on three patients whose condition at the time seemed to justify its performance, whereas others were left, as their condition was hopeless. At operation it was found that the colon, especially in the region of the sigmoid flexure, was greatly thickened and gangrenous, and any attempt at handling it only resulted in tearing the gut, so friable was its condition. In one case that was operated upon before perforation had occurred, a colectomy was performed in the transverse colon, and the distal limb of the bowel, which appeared to be the main site of infection, was washed with warm Dakin's solution. At autopsy the same gangrenous condition of the gut was found.

Gangrenous colitis occurred mainly in cases of long-standing chronic dysentery, of both bacillary and amebic types. The wall of the colon became ulcerated, infiltrated, and enormously thickened. Healing might occur at this stage after repeated acute attacks, and the typical thickened colon of the chronic dysenteric patient remained. If, however, healing did not occur gangrene and perforation were apt to set in suddenly. Most of the cases in which this occurred were complicated by frequently recurring malaria, and we think that this was a definite if not the determining factor in bringing about the lowered vitality of the wall of the bowel which led to the gangrene.

We never saw nor heard of a case that recovered. The onset of the abdominal distension is so rapid that when once it has occurred operation seems hopeless. The toxæmia is so intense that these patients die within a very short time, and operation only hastens their end.

D.—*Gangrenous Proctitis*.—This condition may be due to an extension downwards of the process in gangrenous colitis or may arise primarily. The pathological condition appears to be the same as that occurring in the colon. Painful hæmorrhoids at first appear which rapidly become thrombosed. This is followed by a varying degree of rectal prolapse, the prolapsed portion rapidly becoming gangrenous. The degree of toxæmia varies. It is usually very severe, depending upon the extent to which the rectum is affected. In one case the portion of prolapsed rectum sloughed away and recovery followed, but in three other cases death rapidly ensued, the degree of toxæmia being intense. Colotomy seems to be the only possible treatment, but, speaking from what we saw of this condition, the patients are too ill to stand any surgical interference.

E.—*Synovitis with Effusion into the Larger Joints*.—This complication is usually the result of bacillary dysentery and occurs from the eighteenth day after the infection first manifests itself. Any of the larger joints may be affected, but in our cases most commonly the knee-joint. Very rarely were two joints involved simultaneously. The joint becomes distended with fluid, hot, tender and painful. The fluid shows little tendency to become absorbed when the joint is put to rest. If left alone the condition gradually passes into a chronic state, leaving a thickened synovial membrane which shows very little tendency to resolve. The synovial fluid from these joints is straw-coloured and not turbid; repeated examination has shown it to be sterile.

By far the most satisfactory treatment is early aspiration of the contents and the injection of 5 c.c. of ether into the joint cavity during the acute stage. A general anæsthetic is usually required. The joint should be kept absolutely at rest, and as soon as the acute stage has passed firm strapping with Scott's dressing is employed. With this must be conjoined suitable treatment for the bowel. This treatment certainly gave most satis-

factory results, in that the patients were able subsequently to use the joints without pain, thickening of the synovial membrane was avoided, and the wasting of the muscles around the joint, which was so extreme in cases that had passed on to a sub-acute or chronic stage, was in great part avoided. Subsequent recovery of the muscles was rapid.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.

Toxæmia in Exanthematic Typhus and its Symptomatology (Abbatucci).—A fatal case of exanthematic typhus treated at Beyrouth during an epidemic of that disease showed the following peculiarities: (1) On the fourth day in hospital the temperature fell to normal, and did not rise again for three days. It is well known that a drop in temperature frequently occurs during the early part of the attack, but it is usually only slight and quite temporary. (2) The eruption was not really apparent until the twelfth day; it then developed rapidly from discrete petechiæ to a morbilliform rash. (3) In the first period of the fever, before the fall in temperature, there was a diffuse redness of the face and slight pulmonary congestion. At autopsy the lesions observed resembled those seen after death from arsenical intoxication or from shock following anti-typhoid vaccination. The author remarks that in such intoxications, whether the poison be of an exogenous chemical origin or manufactured by a living virus, the symptoms and pathological findings are strikingly similar.

On the Presence of Pathogenic Cryptococci in the Glands of Goitrous Kids (A. Bachmann).—Observing that the inguinal and axillary glands of a goitrous kid were hypertrophied, the writer found, on examining one of them histologically, that the germinative centres contained large cells, varying greatly in number, in which were enclosed from two to twelve corpuscles, according to the size of the cell. The corpuscles stained readily, and were irregularly circular or ovoid in shape, the chromophile substance taking very varying forms, and appearing sometimes in crescents or rings on the periphery, sometimes in masses collected at the two poles, and sometimes in spheres placed symmetrically at four points on the circumference. When triturated in physiological saline and injected into guinea-pigs, the condition was reproduced as seen in the kid. In the guinea-pig, however, the infection assumed a somewhat severer form, the hypertrophy of the glands being enormous in respect to the size of the animal. None of the staining processes used brought to view any struc-

ture of a protozoal nature, and, though the writer has so far been unable to cultivate the corpuscles, he believes them to be similar to those causing epizootic lymphangitis in the horse. The infection in the kid was apparently secondary and unconnected with the goitre.

Spirochaetosis of Euphorbia and of Latex-infecting Insects (A. Laveran and G. Franchini).—While investigating flagellosis in Euphorbia and the insects propagating it, spirochaetes were observed on several occasions instead of the flagellates sought for. In the insects the spirochaetes measured from 14 to 24 microns in length by $\frac{1}{2}$ micron in width, with four or five spirals; in the plants they measured 6 to 8.50 microns in length only, but were otherwise similar. It would therefore appear probable that side by side with flagellosis exists a spirochaetosis of the Euphorbia. The term would, however, only apply to those cases in which spirochaetes were predominant among the bacteria present.

Note on a Flagellate of the Family Tetramitidae frequently observed in Wounds of a Phagadenic Character (P. Clapier).—Working in the bush in Lower Oubangui, with limited equipment, the author has noticed the presence, in wounds rich in bacteria, of a flagellate he has been unable to identify. The organism resembles *Trichomonas* or *Tetramitus* (*Chilomastix*) in its general appearance and movements. It is pyriform or ovoid in shape, and moves in all directions, sometimes very rapidly, sometimes slowly, but usually by jerks. It appears to have several anterior flagella, too active to be counted, and at the posterior end an inert tapering extension like a posterior flagellum. When fixed in certain positions a cystosome is seen, and what appears to be an undulating membrane. The cytoplasm is granular. The parasite, which is very persistent, thrives best in the dirtiest wounds, and is particularly apt to be found in those to which native methods of treatment have been applied. It is apparently non-pathogenic.

A Complementary Note on Filarial Itch and its Evolution (J. Montpellier, Degouillon and A. Lacroix).—Twenty per cent. (156 out of 800) of a battalion of West African coloured soldiers stationed in Algeria showed primary *Onchocerca volvulus* tumours; 150 of the 156 showed definite signs of filarial eruption, and ninety-eight of these presented both skin lesions and filarial cysts. Six only showed primary *Onchocerca volvulus* tumours unaccompanied by traces of eruption. The writers, who are of the opinion that an intimate connection exists between onchocercosis and filarial dermatitis, explain the cases not apparently conforming to their theory as follows: (1) The position of onchocerca cysts (in deep tissues, &c.) is frequently such as causes them to pass unperceived. (2) The cysts do not of necessity contain actively reproductive females. (3) The embryos migrate in the skin irregularly and not continuously; moreover, the

microfilaria do not of themselves act on the anatomical constitution of the skin, their presence causing pruritus only.

Notes on Strongyloides Intestinalis. The Characteristics and Biology of its Strongyloid Larvæ (L. Rousseau).—In order to differentiate between the eggs of ankylostoma and the larvæ of *Strongyloides intestinalis*, when the two are present in one stool, and also to determine whether the embryos are in the rhabdite or strongyloid stage, the author gently crushes a piece of infected material between a slide and slide cover (taking care it does not reach the edges), and then allows a drop of water to encircle it by capillary attraction. All the strongyloid larvæ of both species appear in the water and thrive therein; the rhabdite larvæ do not take it so readily, and unless they are sufficiently advanced to transform into the strongyloid stage immediately their development is arrested and they die in a few hours. The strongyloid form of *S. intestinalis* is from 125 to 165 microns shorter than that of ankylostoma, and a little thinner; the shell of the former fits it tightly, bends with it, does not overlap at the ends, and is not easily distinguishable, whereas that of the latter does not bend, always overlaps, and can clearly be seen; the movements of the former are more rapid than those of the latter, and, numerically, as three is to two. By renewing the water the strongyloid larvæ of *S. intestinalis* may be kept alive for fourteen days. In physiological saline their maximum life is five days, in sea water three days; in a 1 per 2,000 solution of thymol and a 1 per 100 solution of mercury bichloride they die after two or three hours, in 10 per 100 carbolic acid and 10 per 100 formal after a few minutes, and in Gram's solution almost immediately; they are unaffected by 3 per 100 emetine hydrochloride and 1 per 100 tartar emetic. The author is of the opinion that the question as to whether the rhabdite larvæ of *S. intestinalis* will pass through a sexual stage or will transform directly into the strongyloid form is not one of temperature, but that (at least at the equator) the two processes go on side by side at the same temperature and in the same medium.

Stephanurus Dentatus as a Parasite of Pigs in Guiana (Louis Rousseau).—Having discovered that the whole of the pigs bred on the French penitentiary settlement of Devil's Island are infected with *Stephanurus dentatus*, the author brings the fact to the notice of medical men in the tropics who, in the absence of veterinary surgeons, may have to decide whether an animal is fit for food. In young pigs, where the worms are not yet visible in the nodules, the condition may be diagnosed from the hepatic cysts in conjunction with small reddish spots around the ureter. At any stage of the disease it is sufficient to destroy the liver and the tissues surrounding the kidneys, all the rest of the carcase being healthy.

Original Communications.

THE TREATMENT OF KALA-AZAR WITH SOME NEW ANTIMONIAL PREPARATIONS.

By U. N. BRAHMACHARI, M.A., M.D., Ph.D.

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THE new antimonial compounds which I am going to describe in this paper may be divided into two classes:—

(1) New antimonial tartrates.

(2) Aryl or phenyl antimonial compounds.

(1) Includes (a) urea-antimonyl tartrate, (b) ammonium antimonyl tartrate.

(2) Includes (a) phenyl-stibiato of sodium, (b) acetyl-p-amino-phenyl stibiato of sodium, (c) p-amino-phenyl-stibiato of sodium or antimony analogue of soamin.

I shall now give a report of my experience with some of these antimonial compounds in the treatment of kala-azar. As most of these compounds have only been recently used by me in this disease, the report must be regarded as a preliminary one.

UREA-ANTIMONYL TARTRATE.

This is a new compound. The method of its preparation was described by me at the July meeting of the Asiatic Society of Bengal last year. The amount of antimony present in it is nearly 38 per cent. It has been used by me both intravenously as well as intramuscularly. Intravenously it has, up to now, been used in four cases.

The following are the notes of these cases:—

(I) Patient, K., aged 35. Leishman-Donovan bodies present in the spleen. 2 to 5 c.c. of a 2 per cent. solution injected.

Results of Treatment.—Blood: (1) Red blood corpuscles, 2,400,000; white blood corpuscles, 1,000; hæmoglobin, 38 per cent. on July 16, 1920, before treatment. (2) Red blood corpuscles, 3,000,000; white blood corpuscles, 5,800; hæmoglobin, 44 per cent. on November 13, 1920. (3) Spleen extended 5½ in. below costal arch on July 16, 1920, before treatment. Spleen extended 2½ in. below costal arch on November 13, 1920. Increase of body weight, 7 lb. Fever stopped after twelve injections. No Leishman-Donovan bodies in the spleen after fifteen injections.

(II) Patient, S., aged 15. Leishman-Donovan bodies present in the spleen. 2 to 4 c.c. of a 2 per cent. solution injected.

Results of Treatment.—Blood: (1) Red blood corpuscles, 36,000,000; white blood corpuscles, 4,000; hæmoglobin, 46 per cent. before treatment. (2) Red blood corpuscles, 3,900,000; white blood corpuscles, 10,400; hæmoglobin, 52 per cent. on November 1 and 3, 1920, after seventeen injections. Spleen extended 5 in. below costal arch at the beginning of treatment. Spleen extended 1½ in. below costal arch after seventeen injections. No

Leishman-Donovan bodies on spleen puncture. Increase in body weight, 1 stone. Fever stopped after eight injections.

(III) Patient, H., aged 20. Leishman-Donovan bodies present in the spleen. 2 to 4 c.c. of a 2 per cent. solution injected.

Results of Treatment.—Blood: (1) Red blood corpuscles, 2,400,000; white blood corpuscles, 1,600; hæmoglobin, 32 per cent. before treatment. (2) Red blood corpuscles, 3,500,000; white blood corpuscles, 10,000; hæmoglobin, 52 per cent. on November 13, 1920, after sixteen injections. Spleen extended 5¼ in. below costal arch before treatment. Spleen extended 1½ in. below costal arch after sixteen injections. No Leishman-Donovan bodies on spleen puncture. Increase of body weight, 2 lb. Fever stopped after three injections.

(IV) Patient, K., aged 26. Leishman-Donovan bodies present in the spleen. 2 to 6 c.c. of a 2 per cent. solution injected.

Results of Treatment.—Blood: (1) Red blood corpuscles, 2,400,000; white blood corpuscles, 1,200; hæmoglobin, 38 per cent. before treatment. (2) Red blood corpuscles, 2,700,000; white blood corpuscles, 3,400; hæmoglobin, 42 per cent. after eleven injections. Spleen extended 5 in. below costal arch before treatment. Spleen extended 4 in. below costal arch after eleven injections.

Up to now, urea-antimonyl tartrate does not seem to be superior to tartar emetic or antimonyl sodium tartrate, but it appears to me that symptoms, such as vomiting, severe cough or high rises of temperature do not follow the intravenous injections of urea-antimonyl tartrate.

Intramuscularly this preparation has up to now been used in two cases.

The following are the notes of these cases:—

(I) Patient, S., aged 24. Leishman-Donovan bodies found on spleen puncture.

Results of Treatment.—Blood: (1) Red blood corpuscles, 1,400,000; white blood corpuscles, 1,600; hæmoglobin, 22 per cent. before treatment. (2) Red blood corpuscles, 2,300,000; white blood corpuscles, 4,800; hæmoglobin, 32 per cent. after eleven injections. (3) Red blood corpuscles, 3,300,000; white blood corpuscles, 7,800; hæmoglobin, 40 per cent. after twenty injections. Spleen 4½ in. below costal arch before treatment. Spleen 3 in. below costal arch after eleven injections. Spleen 1 in. below costal arch after twenty injections. Body weight same as before. No Leishman-Donovan bodies on spleen puncture after twenty injections. Dose, 1 to 2 gr. daily. There was some inflammation at the sites of injection, but there was never any suppuration at the sites of injection.

(II) Patient, D., aged 10. Leishman-Donovan bodies present in the spleen.

Results of Treatment.—Blood: (1) Red blood corpuscles, 2,800,000; white blood corpuscles, 3,800; hæmoglobin, 30 per cent. before treatment. (2) Red blood corpuscles, 3,600,000; white blood corpuscles, 3,400; hæmoglobin, 42 per cent. after

twelve injections. (3) Red blood corpuscles, 3,600,000; white blood corpuscles, 4,400; hæmoglobin, 48 per cent. after twenty injections. Spleen reduced by 1 in. Dose, $\frac{1}{2}$ to 1 gr. Local reaction, no abscess, but sometimes swelling and inflammation. Fever stopped after sixteen injections. No Leishman-Donovan bodies on spleen puncture after sixteen injections.

In both the above cases the local reactions were less severe than what are met with in the case of potassium antimonyl tartrate.

AMMONIUM ANTIMONYL TARTRATE.

This preparation has up to now been used by me only intramuscularly. The amount of antimony present in it is nearly 40 per cent. I have prepared this salt by neutralizing hyper-acid antimonyl tartrate with ammonium carbonate and washing the precipitate with absolute alcohol.

The following are the notes of one case treated with it intramuscularly:—

Patient, B., aged 10. Leishman-Donovan bodies present in the spleen. (1) Red blood corpuscle, 1,600,000; white blood corpuscles, 800; hæmoglobin, 36 per cent. before treatment. (2) Red blood corpuscles, 2,400,000; white blood corpuscles, 2,800; hæmoglobin, 40 per cent. after three injections. Spleen, 5 in. below costal arch before treatment. Spleen, 3 in. below costal arch after three injections. Doses, 1 to 2 c.c. of 2 per cent. Fever stopped after three injections. Treatment still being continued.

Intramuscularly this salt is much less irritating than Tzuzi's antilueticin, which is ammonium potassium antimonyl tartrate.

THE ARYL ANTIMONIAL COMPOUNDS.

I have been successful in preparing these with the help of my chemist, who has been working under me under a grant for the Indian Research Fund Association.

The following compounds have already been made:—

(1) Phenyl-stibinic acid and its sodium and ammonium salts.

(2) P-amino-phenyl-stibinic acid and its sodium salt.

(3) Acetyl-amino-phenyl stibinic acid and its sodium salt.

The salts of phenyl stibinic acid are too irritating and too toxic to be used for therapeutic purposes.

The amino-aryl compounds are extremely difficult to prepare. "Stibenyl," which is allied to the acetyl compound, has been used by me in two cases, in one intramuscularly, and in the other intravenously.

The following are the notes of these cases. The treatment is still being continued.

(1) Patient, M., aged 35. Leishman-Donovan bodies found in the spleen. (1) Red blood corpuscles, 2,100,000; white blood corpuscles, 2,800; hæmoglobin, 32 per cent. before treatment. (2) Red blood corpuscles, 2,600,000; white blood cor-

puses, 2,200; hæmoglobin, 34 per cent. after six injections. (3) Red blood corpuscles, 3,400,000; white blood corpuscles, 8,200; hæmoglobin, 48 per cent. after eleven injections. Injections given intravenously on alternate days. After ninth injection patient developed eruptions on his body similar to chicken-pox. Spleen could just be felt below the costal arch. Increase of body weight, 2 stone. No Leishman-Donovan bodies on spleen puncture. Dose, (1) .1 grm., (2) .15 grm., (3) .2 grm., (4) .3 grm., (5) .4 grm., (6) .5 grm., (7) .6 grm., (8) .8 grm., (9) 1 grm., (10) .15 grm., (11) .2 grm.

(11) Patient, H., aged 19. Leishman-Donovan bodies found in the spleen. (1) Red blood corpuscles, 2,900,000; white blood corpuscles, 1,800; hæmoglobin, 54 per cent. before treatment. (2) Red blood corpuscles, 3,900,000; white blood corpuscles, 2,800; hæmoglobin, 50 per cent. after five injections. Dose, (1) .1 grm., (2) .15 grm., (3) .2 grm., (4) .3 grm., (5) .8 grm. All the doses were given intramuscularly.

The injections were given on alternate days. There was much local irritation with pain and effusion into the injected parts, which slowly subsided.

This patient also developed eruptions similar to the above after the last injection.

P-amino-phenyl-stibinate of sodium (antimony analogue of soamin).—This has been used by me in one case intramuscularly in 1-gr. doses given every day. No local reaction. I propose to give it the name of "Stibamine." Subsequently I have been using it in bigger doses of .2 to .3 grm., as its toxicity appears to be low.

So far, it is too early to give any definite opinion about the effect of this antimonial preparation.

Before ending my paper, I would like to point out that intravenous injection of narcotine is followed by increase in the leucocyte count, a fact that I observed before. It is best given intravenously in solution in tartaric acid.

The two following cases of kala-azar illustrate the leucocyte-increasing properties of narcotine:—

(1) Patient, M., aged 12. Leishman-Donovan bodies present in the spleen. (1) Red blood corpuscles, 3,200,000; white blood corpuscles, 3,400; hæmoglobin, 42 per cent. before treatment. (2) Red blood corpuscles, 3,400,000; white blood corpuscles, 7,600; hæmoglobin, 48 per cent. after twenty-two injections. Condition of spleen, same as before. Increase of body weight, 5 lb. in three weeks. The increase of the leucocyte does not seem to be temporary. Dose, $\frac{1}{4}$ to 1 gr., given every day.

(11) Patient, A., aged 30. Leishman-Donovan bodies found in the spleen. (1) Red blood corpuscles, 2,400,000; white blood corpuscles, 2,400; hæmoglobin, 46 per cent. before injection. (2) Red blood corpuscles, 3,000,000; white blood corpuscles, 5,200; hæmoglobin, 46 per cent. after twenty-six injections. The increase in leucocyte count does not seem to be temporary.

I may state here that I have been able to prepare

narcotine-antimonyl-tartrate as a definite crystalline compound. It is sparingly soluble in water, easily soluble in tartaric acid. Narcotine-antimonyl-tartrate is a new compound.

The best antimonial preparation to be used in the treatment of kala-azar has not yet been discovered. Tartar emetic and antimonyl sodium tartrate have their serious drawbacks, with which unfortunately we are more or less familiar. The discovery of the amino antimony analogues of arsenical compounds opens up a new vista in the treatment of the disease. Anyone who thinks that the last word about the best antimony preparation has already been told in tartar emetic or antimonyl sodium tartrate is wrong. One must pass from one antimony preparation to another to discover the one that is best. Who knows that "606" or "914" antimonyl compounds may not have to be used till such a compound is discovered. It is stated that Ehrlich used nearly 600 arsenical preparations in 900 days from 1910-1913 in his attempt to discover the best for the treatment of spirillosis. And still we hear of newer arsenical compounds, such as methylated salvarsan compounds, hex-amino-arseno-benzene, tri-amino-phenyl arsenic acid, silver-salvarsan and others. Something approaching this has just been begun in the case of antimony.

To me it appears that a day will come when in studying the organic derivatives of antimony one will be reminded of a simile employed by Dr. Bertheim about the chemistry of organic arsenic compounds. He compares it to a sleeping beauty slumbering until quite recently in an unfrequented corner of Boilstein, but who, now awakened, appears as one of the fairy gifts which synthetic chemistry bestows from time to time upon mankind. Let us, who have to deal with dreadful kala-azar, hope that such a fairy will be discovered in the case of antimony. The words of Basil Valentine, who stated centuries ago that he who deals with antimony must have an ample mind, are very true.

REMARKS.

(1) Urea-antimonyl tartrate, a new definite compound, has been prepared and used in kala-azar intravenously as well as intramuscularly.

(2) Ammonium antimonyl tartrate has been prepared in a pure state. It is less irritating than antilnetin. It has been used intramuscularly in kala-azar.

(3) Narcotine-antimonyl tartrate, a new definite compound has been prepared.

(4) Acetyl-p-amino-phenyl-stibinate of sodium, which is allied to the patented "Stibanyl," has been prepared and used in kala-azar.

(5) P-amino-phenyl-stibinate of sodium, which is the antimony analogue of soamin, has been prepared, and is being used in kala-azar. Its toxicity appears to be low. I propose to give it the name "Stibamine."

(6) As the best antimonial preparation for the

treatment of kala-azar has yet to be discovered, one must not rest contented with the use of tartar emetic or antimonyl sodium tartrate.

A CASE OF AFEBRILE QUARTAN MALARIA, WITH URTICARIA.

By Professor Dr. JOÃS A. G. FRÖES.

Professor of Clinical Medicine at Bahia Medical School (Brazil).

THE patient was a coloured woman, 25 years old, a cook, who suffered from urticarial manifestations every four days at 11 o'clock, without any other symptoms—no fever, no chill, no perspiration. When first I saw her, she told me there were already two months the sickness had begun; she had never had malaria, notwithstanding she had lived in a malarial district in Bahia (Brazil).

The physical examination revealed only some pain on pressure in the epigastric region, at the left lobe of the liver; the spleen was not painful and not palpable, slightly increased in size as shown by percussion and phonometry.

As I suspected larved malaria from the periodicity of the urticaria, I took some blood to detect the malarial parasites, and I was very well rewarded, because I found a great number of parasites, with every characterization of the *Plasmodium malariae* i.e., coarse pigment, easy sporulation in the peripheric circulation, very fine daisies with ten or eleven sporulated bodies, erythrocytes normal in size, neither anisocytose or poikilocytose nor erythroblastose or polychromatophilia. These slides were examined by Professor G. Moniz and Professor Octavio Torres, and several members of the Hospital's Medical Society when I read a paper on this subject in October, 1920.

The thin films were stained with Leishman's stain, and the thick ones with a mixture of acid methylene blue, as I formerly published in the JOURNAL OF TROPICAL MEDICINE AND HYGIENE (1913, vol. xvi, p. 272). The acid methylene blue solution has the advantage of destroying the haemoglobin, so that not only the pigment but also the full parasite can easily be detected.

I observed my patient during a fortnight, and the urticaria never failed to appear every four days during the first two weeks; after the quinization of the patient the sickness diminished gradually and disappeared, notwithstanding the fact of some quartan parasites remaining in the blood.

This case seems important to me, because quartan fever is not common in Bahia, especially the simplex type, and yet more because the malaria was masked by urticaria.

Besides this case I have had two other patients suffering from urticaria of malarial origin; but in both cases the parasite was *Plasmodium vivax*, and they recovered easily with the quinine treatment.

Masked paludism is found more often in Bahia, under the forms of neuralgias, hepatic colics, headaches, lethargy, coma, convulsions, &c.

Four years ago, while acting for a colleague, I was

called to a patient who was in bed, very feeble and unable to walk; he had come from a malarial district, where it was believed paludism did not exist, and a diagnosis of polyneuritis had been made. After my examination, when I found a palpable spleen, I took some films of blood, both thin and thick films, and its microscopic examination showed numerous parasites of malign tertian malaria.

As I have seen some other cases of malarial polyneuritis confirmed by the microscopic examination of the blood, I have no doubt in admitting it, notwithstanding the opinion of many authorities who are denying the existence of this condition.

CANCER OF THE LIVER IN THE AFRICAN NATIVE.

By A. YALE MASSEY.

Coquilhatville, Belgian Congo.

THE incidence of malignant disease among the uncivilized native races of Central Africa has occupied the attention of not a few medical men. It is always unsafe to conclude that a certain condition does not exist because one has not met with it. After fifteen years of medical work in Central Africa I came upon my first case of cancer of the liver. And oddly enough a second case presented itself within a month of the first. I was fortunate enough in getting autopsies on both. The locality was the Kasai district of the Belgian Congo 23° E. long. and 5° S. lat.

The first was in a Batatela woman of about 30 years, who had lived the ordinary native life, her food consisting of maize, kassava, monkey nuts, native greens, palm-oil, with now and again a little fish from the local streams, or wild meat such as that of the antelope, buffalo, or small rodents. The tumour was of the ordinary large nodular form and weighed fourteen pounds.

The second case was in a man of about 40 years, of the same race but far removed as to locality. He was of the ordinary common or garden type of native who has never wandered from his native heath. His tumour was the same as the first, and weighed ten pounds. In each case the weight represents the entire liver.

Both tumours were of the multiple nodular form, the umbilicated surface nodules as big as walnuts and easily felt through the abdominal wall. It is evident that they were secondary in origin, although I did not find the primary focus.

Creeping Eruption (Joseph Klauder and Sigmund Greenbaum, *Archives of Dermatology and Syphilology*, vol. iii, No. 3, March, 1921).—The authors describe a case of creeping eruption in a 6-year old girl. The affection started as a small vesicle on the foot, extending in typical linear fashion. The disease was probably picked up by the child while walking barefooted in the sand, as the condition is usually due to the larvæ of the horse-fly (*Gastrophilus hemorrhoidalis*).

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AUGUST 15, 1921.

DROUGHT AND FLOODS.

THE summer of 1921 will be remembered in some parts of England for some years as one of serious drought. Not since the years 1897 to 1901 has anything approaching its intensity and continuance been observed within the past quarter of a century.

The study of climatic conditions in relation to disease has been allowed to partly lapse during recent years, so intently has our attention been directed to other causes of disease, more especially those of a bacterial and parasitic nature. By regarding ailments due to climate and to infection as distinct it is possible we are in error, for it may be that the two groups of causes may be dependent the one on the other. Severe droughts or excessive rainfalls on the one hand, may be linked with, and probably are so linked with epidemics due to infections or contagions on the other in an inseparable combination. To look more carefully into matters, bearing the possible relations of meteorological conditions and the presence of disease in mind may not be altogether profitless. The part played by insects in the spread of disease has been a theme which has engrossed all our tropical experts for well-nigh a score of years, and we have arrived at a stage of knowledge which is at once astounding and engrossing. We know now that all the so-called "verminous" animals are termed vermin because they carry disease; that fact accounts for the hatred and dread of vermin which has come down to us from ancient times, more especially through women as a household legend, without the exact explanations which investigations and scientific observation have revealed to us at the present day.

During the spring and into the summer of 1921 for a period of some four months the wind was in the north-east, insect life was much in abeyance and the health of the community was extraordinarily good, the dry weather was continuous and the sunshine remarkable; in consequence the children were much out of doors and ventilation on account of the abnormal heat excellent; this combined with the diminution of insect carriers of germs owing to the prevalence of north-east wind, lessened the sickness and death-rate, notably amongst young children. When in the latter half of July the wind changed to the south-west insect life became active and disease became more evident. Later, in the second week in August, the wind reverted to north-east, and insect life again lessened out-of-doors and the house-fly was driven indoors in huge quantities, when food was apt to become more contaminated and "to keep" badly. Bowel troubles became more prevalent and the gastro-enteritis of children more deadly.

Phthysical patients did well during the dry hot weather owing to the drought, for with the north-east wind and bright sunshine and rain except in infinitesimal quantity for a period of three and a half months, allowed of out-of-door life to an unwonted extent in England. Patients sent home to England from the tropics suffering from chest affections did well during the spring and summer of 1921, and if not cured, their pulmonary signs and symptoms were kept in abeyance until the weather broke, when the N.E. wind ceased and the moist S.W. wind set in. These are everyday observations and what one would expect, but it is as well to state the facts, for we are apt to forget the effects due to drought and all that it implies.

Looking farther afield it will be found that during the dry and droughty seasons the rivers are low, that cholera often appears in pandemic form. In Egypt, for instance, when in summer the Nile is exceptionally low, cholera is met with in more or less severe form. In India the wells are infested with flies to an extraordinary extent owing to the scarcity of water elsewhere, and enteric, cholera and dysenteries owing to well water contamination become rife. On the other hand, influenza well-nigh disappears when drought prevails, and if the legend be true that the modern outbreak of influenza followed the drought that occurred in northern China upon the subsidence of the great floods along the Yellow River in 1887 when it burst its banks and covered the country to an extent far beyond any previous record, the surmise of succeeding drought being the cause of influenza has to be postulated. After the subsiding of the floods, the dead bodies were found according to common report in "millions," and many people ascribed the influenza epidemic that followed to the decomposition of these unburied bodies polluting the atmosphere. The earth as it revolved beneath this cloud of foul air became saturated with these germs and influenza was the result. Such is the current popular belief, people hold that germs, and with them the fine sand and dust, in consequence of first floods and then heat and drought contributed to these results, and to these influenza has been rightly or wrongly ascribed.

These remarks apply to the effects of weather as distinct from climate, to accidents rather than to the meteorological constants that prevail in different zones of latitudes. No climate is quite constant, the nearest approach is the Equatorial belt, where calm is the rule but yet there constancy is not scientifically correct.

When we come to an insular or temperate climate like Britain inconstancy is the rule and the weather is more or less "accidental" in its behaviour.

In Australia we find drought is a great dread, its duration, its intensity, the uncertainty of its appearance and continuance no doubt in ages gone by were the chief causes of its being avoided or deserted by human beings and by animals, domestic and wild. One can even imagine Australia becoming depopulated by a drought which instead of lasting two or three years as it usually does, continuing for some ten or twelve years, when life for human beings and for animals would become well-nigh impossible and the country becoming as barren as the Sahara.

In Britain it is said more famines have occurred from drought than in any other country. At the present day actual famine is prevented by inter-communication by steamship carriage from overseas countries, but before 1850, when small sailing vessels were the rule, we have accounts of famines in the 'twenties and even the 'thirties of last century when corn failed during several years and shortage of food due to drought amounted in many parts to starvation. It is said that more famines are recorded in Britain than in any known country; as

many as 143 are stated to have occurred, and all have been mere accidents of climate. This year, 1921, in the south-east of England potatoes, grass, green vegetables, and most of our fruits have failed us, causing deterioration in our diet and the loss of the fresh juices which bring a scorbutic tendency, anæmia, &c., with all their train of ill-health. Grain was the only plentiful yield in 1921, but grain, like rice, maize, &c., when practically the only food, leads to food deterioration, and beriberi and its allies are brought near to hand. Fresh vegetables are well-nigh unprocurable even now in towns in south-east England, and as the winter progresses they will become more and more scarce, especially for the less opulent sections of our people. Cows' milk, that great standby of the children of Britain, has already diminished to less than half its normal quantity owing to shortage of grass, and the winter food of cattle—turnips, mangel-wurzel and beans—are practically "no crop." The scarcity of drinking water, especially for animals, is a common complaint, even affecting the quantity of milk the cows yield, and causing loss of weight and flesh amongst stock.

Both to mankind and animals a drought is more detrimental than an excess of moisture. A flood does its work swiftly and finishes quickly; a drought ensues with its monotony of bright skies, waning vegetation, as a tax on life, and a lowering of strength. Drought for a few months affects big towns in Britain but slightly; but in 1901, after four years of drought, 1898-1901, the London supply was reduced so that the water was "turned on" for household use for ten minutes (and even five minutes for a few days) only in the twenty-four hours for several weeks. In the country the immediate effects are more noticeable and prompt. A six weeks' drought will arrest the growth of grain; a two months' drought will see the grass assume a brown colour; a three months' drought will see the ponds completely dry up, and most of the shallow wells in a chalky area as in the south-east of England dry up. Rivers and streams in a chalk soil are few and far between, and in the intervening country the vegetation suffers, and cattle, horses, sheep, &c., have to be driven afar or slaughtered owing to want of water. Milk falls in quantity or the cows may become actually dry. It is a mistake therefore to imagine that in the "moist" temperate climate of Britain droughts and their consequences on man and beast are unknown. The fact is, if we are to believe the legends handed down to us, that 143 famines, as stated above, have occurred in Britain during 1,000 years of time, may be true, for during the present century 1901, and again in 1921, the water supply has been threatened, and to such an extent in 1901 that water could only be laid on for a month of time for five or ten minutes only, in London. It would be well were our experts in meteorology and those who study epidemiology to work together and make known to us the results of their investigations as regards disease due to these "weather accidents."

If these effects are met with in moist England only those who have been through a three years' drought in Australia or elsewhere are aware of the suffering entailed directly from the loss of animals and indirectly by the ailments which accompany and follow upon prolonged drought. One will naturally ask what happens in countries where rain never falls, as at many places on the eastern shores of South America, Aden, Arabia and several other places in the world, to the health of the people. In a general way we know how this detriment is overcome, but we have no exact data as to the diseases that prevail and those that are not met with in these districts. A systematic study of these would be interesting in the extreme, but such an inquiry would imply a long and close investigation extending over a length of time and involve an expense which as yet the world is not prepared to expend on this branch of science.

J. C.

Annotations.

Peculiar Bodies found in Typhus (G. Ficaï, *Annali d'Igiene*, December, 1920).—The author has found a large number of round bodies in the brain cells of typhus cadavers and in the epithelial cells of the stomachs of lice infected with typhus virus. These corpuscles were never observed in controls. They are similar to the cellular or corpuscular inclusion bodies noted in other diseases with a filtrable virus. The bodies found are of two varieties: small, of homogeneous structure; and large forms, with from one to five secondary corpuscles, or a single central body.

Heatstroke and Sunstroke (L. Figueras Ballester, *Siglo Medico*, March, 1921).—According to the author, the pigmentation of the skin of negroes allows the utilization of the heat from without to such an extent that the organism does not need so many calories as white men, while they stand exposure to heat much better. Negroes in Guinea keep in perfectly good health on a diet of rice, fish and butter, representing only 1,843 calories, although at severe manual work. On the other hand, white men, even when not at work, require twice this amount of calories to keep them fit. The author points out that this is due to the fact that the dark skin acts something like the chlorophyll of plants in transforming the heat absorbed, and thus enabling it to be utilized directly for the benefit of the organism.

Notes on a Case of Blackwater Fever treated by Pancreatic Amylopsin and Trypsin (J. H. Douglass and H. Carlton, *Journ. Roy. Army Med. Corps*, February, 1921).—A case of blackwater fever is described, treated by hypodermic injections of pancreatic amylopsin and one of trypsin. The authors believe that but for this treatment the case

would have proved fatal. Good results are also claimed for the preparations in cases of malignant tertian malaria, but at present the number of cases treated are too small to give a decided opinion.

Abstracts and Reprints.

HYMENOLEPIS NANA: POSSIBLE CERCO-CYSTIS STAGE.¹

By ALFRED GOLDMAN, M.D., St. Louis.

SINCE the prediction of Stiles that *Hymenolepis nana* would prove to be a common intestinal parasite in the United States, cases have been reported with increasing frequency, and the indications are that it is the most common tapeworm in many parts of the United States.

Ransom compiled the United States cases up to 1904, reporting twenty-five cases, all but one of the twenty-five having been reported after 1902.

Deaderick, in reporting two new cases in 1910, found that the number had reached thirty-three.

Schloss in the same year reported twenty cases of *H. nana* in 280 children examined for intestinal parasites and only five cases of *Tænia saginata*.

Amesse reported one case from Professor Howland's service at Bellevue Hospital.

M. A. Wood reported three cases of *H. nana* from Houston, Texas.

Bass and Gage reported fifteen cases out of 577 persons examined in New Orleans, and only three cases of *T. saginata*.

H. B. Wood, from records of examinations made during 1911 and the first quarter of 1912 in the State laboratories of the South, found *H. nana* in 1,004 of 62,785 persons examined, and only ten cases of *T. saginata*.

Deaderick and Thompson stated that during 1911-1913, of 56,543 infections found by the Rockefeller Sanitary Commission, 1,879, or 3.3 per cent., were dwarf tapeworm.

Gerber reported the first case in Boston.

Judkins found seventy-one cases among 15,000 people examined throughout Texas.

McNeil reported six cases of *H. nana* in the Southern Pacific Hospital in Houston, Texas.

Greil found seventy-five children under 12 years of age in Montgomery, Ala., with dwarf tapeworm infection.

Frey reported that out of 118 cases of parasite infections in the Texas State Orphan Home, 32.6 per cent. were *H. nana*.

Van Lier reported one case in twenty foreign students examined at the University of Wisconsin.

Willets reported six cases in the Georgia State Sanitarium.

Lyon, in a study of 477 patients at the Walter Reed General Hospital, found two cases of dwarf

tapeworm and five cases of *T. saginata*. The latter, however, were diagnosed before being referred to the hospital.

Kofoid and Kornhauser examined the stools of 1,200 American soldiers who had been overseas and of 300 home service men. In the former series there were seven cases of *H. nana*; in the latter none.

De Buys studied 595 children from seven different institutions in New Orleans, and found *H. nana* in fifty-five cases, or 9.25 per cent. No other tapeworms were found.

Lucke reported 230 cases of dwarf tapeworm in 35,000 white and black troops at Camp Zachary Taylor, Kentucky. *T. saginata* was found twelve times.

Notwithstanding the fact that the parasite has been one of the most frequently encountered, according to the reports of several authors, yet in many localities *H. nana* has either not been looked for or has not been found. So far as is known there are no case reports from the region of St. Louis.

The following cases occurred in that city in the B. family, coloured. The family came to St. Louis from Mississippi early in 1917. There were eight children, seven of whom were infected with the dwarf tapeworm and the eighth with *Ascaris lumbricoides*. The mother had pin worms, the father was free from parasites. The first patient was sent into Barnes Hospital from the out-patient pediatric service, the others were seen at their home.

The morphology of the worms does not differ essentially in any respect from the usual descriptions. Specimens sent to Dr. C. W. Stiles, who kindly reported that he identified the worms as *H. nana*, the eggs belonging to the same.

In Case 1, the large number of very young specimens found, the smallest being 3 by 0.15 mm., is noteworthy. The largest specimens were 15 mm. in length, the maximum width 0.6 mm. Senna, cited by Ransom, noticed in faeces containing *H. nana* eggs many small rounded bodies measuring from 5 to 30 microns in diameter. The smaller of these were homogeneous, with a thin membrane, while the larger were more granular and tended to become oval, with thicker membrane. Senna thought these might be eggs in the course of development which had prematurely escaped from the uterus, but finding similar bodies in two cases in which he could not demonstrate the presence of *H. nana*, he was left in doubt as to their true nature. In Case 1, of this series, thirteen days after the second course of the male fern and before the eggs had reappeared in the stools, there were found a large number of homogeneous structures from 5 to 15 microns in diameter, bounded by a thin membrane. The next day, for the first time, *H. nana* eggs were observed, with fewer of the smaller structures. These were not observed again.

SYMPTOMS.

Of the seven cases four had definite symptoms, which, in the absence of other factors, may be attri-

¹ Abstracted from *Archives of Internal Medicine*, September 15, 1920.

buted to the dwarf tapeworm. Two of the children had no symptoms, and in both cases very few eggs were found. One patient with a heavy infection had long-standing headache, which may possibly have been due to the parasites. The most frequent symptoms were abdominal pain, or tenderness, and diarrhoea, found in four cases. There were anæmia, dizziness and headache in two cases, increased appetite in one case. The presence of blood in Case 1 is interesting. Innes, cited by Ransom, in reporting a necropsy on a case, states that he found bloody extravasations on the mucous membrane of the ileum, which may have been the points of attachment of the tapeworm lying free in the intestine.

Eosinophilia, according to Schloss and others, a constant finding in cases showing symptoms, ranged from 2 to 9 per cent. In the children with definite symptoms it was from 6 to 9 per cent., while in others it was from 2 to 3 per cent.

Treatment was instituted in three cases, and an apparent amelioration of symptoms occurred in all. Case 1, after four courses of treatment, still showed a few eggs in the stool on the day of the patient's discharge. Subsequently, after an attack of measles, his intestinal symptoms reappeared. In Case 4 apparently complete cure was obtained after one course of male fern. In Case 7 few eggs showed after one course of treatment.

MODE OF INFECTION.

The development as well as the manner of infection of the dwarf tapeworm is unknown. There is a form of tapeworm common in rats, the *Hymenolepis murina* of Dujardin, which morphologically is very similar to *H. nana*. Grassi, quoted by Ransom, found this parasite common in rats in Catania, where also the dwarf tapeworm was common. In a series of carefully conducted experiments, he showed that the feeding of mature segments of *H. murina* to rats was followed by infection with this tapeworm. The eggs liberate six-hooked embryos in the small intestine, which enter the villi of the last part of the ileum and there become transformed into cercocysts. The position of each cercocyst is in the dilated central lymphatic cavity of the villus. Subsequently, the cercocyst leaves its position in the villus and becomes changed to the adult worm, and is attached to the epithelium of the intestine. Just how the latter stage ensues is not noted. Joyeux repeated these experiments successfully.

Grassi, Lutz and Ransom consider *H. nana* of man identical with the rat hymenolepis, but Braun, Loos and others doubt this. Grassi, Loos, Stiles, Schnell and Joyeux were unable to transmit the infection to rats and mice. Stiles states that the form from rodents is entitled to at least sub-specific rank. Castellani states that the dwarf tapeworm of man is probably distinct from the rat type.

Minchin and Nicholl, and later Johnston, state that they found cysticercoids of *H. murina* in the body cavity of *Xenopsylla cheopis* and *Ceratophyllus fasciatus*, but Joyeux states that he was

unable to transmit the infection experimentally in these and other fleas.

Grassi fed worms and eggs of both types to eight individuals, and in only one case were adult tapeworms found. In this case, a boy of 5 began to pass eggs fifteen days after ingesting several segments of the rat hymenolepis, and later expelled fifty worms on treatment. In another instance a boy who was previously free from *H. nana* was infected after a month, during which time he was collecting the faeces of an infected patient. Grassi himself raises objections to these cases because of the high incidence of *H. nana* in the locality, and because worms may be present, although the stools are egg free.

The experiments of Grassi, together with the failure to find an intermediate host, have led to the assumption that the mode of infection is direct, and that man himself, like the rat, may be the intermediate host. Stiles accepts this possibility. As possible evidence of direct infection, Grassi cites cases of dwarf tapeworm infection in several individuals, previously egg free, in whose families there were known to be cases of *H. nana*. Schloss cites two similar cases in his series. The frequent findings of infection in several members of the same household would also point to the possibility of a direct infection. Thus the Hygienic Laboratory staff found five cases in the same ward in an insane asylum. Magnenat, quoted by Stiles, reported four cases in the same family. In all but one of Schloss's cases several members of the same family were infected. Carpenter, in discussing De Buys' paper before the American Pediatric Society, described an epidemic of *H. nana* in a foundling asylum in Philadelphia and thinks the infection was direct. Rats examined by him were negative.

I attempted to determine the mode of infection of the dwarf tapeworm. The feeding of eggs and mature segments to six rats and six mice was negative. Attempts to incubate the eggs following their mixture with artificial gastric juice were also negative.

The house of family B. was carefully inspected and found to be in a very unsanitary condition. The children played around the floor a great deal, so that chances for coprophagia were very favourable. There were no rats. Several bedbugs were examined and were negative for cysticerci. Several lice from the head of Case 4 were also negative.

There was an old pet dog with which the children were very intimate. A stool from the dog, obtained while the dog was at the B. home, showed several eggs, which were exactly similar to eggs of *H. nana*, the characteristic filaments of the latter being present. There were also present trichomonads and eggs of *Dipylidium caninum* and *Tenia serrata*. The dog was removed from the home and daily examinations of the stools were made, but hymenolepis eggs could no longer be found. Two weeks later a necropsy was made, and *D. caninum* and *T. serrata*, but no *H. nana* were recovered.

The presence of the parasite in all but the oldest

boy, aged 12, is of interest. In Case 5, no eggs were observed in the specimen of February 22 after twelve examinations, while on March 27 the stool was loaded with them. The difficulty of ridding the host of all the worms is a striking feature. It has been stated by Ransom and other authors that one course of treatment is frequently not sufficient. In two of my cases which were treated eggs showed subsequently. In Case 1 four courses of treatment were given, and at the end of these there were still many eggs present. The large number of very young forms following the second treatment were striking.

Following the last administration of the vermifuge, the full dose being repeated next day because of the vomiting of the male fern, there were passed a number of mucoid-looking tags of tissue, but no worms. The largest of these pieces were 20 by 10 mm. Each had from two to eight heads of *H. nana* studded throughout it, but no segments could be found. Microscopically, there were observed the rostellum, a row of hooklets, four suckers and a small caudal appendage. Surrounding each head there could be seen in the unstained specimen a definitely clear area. In the stained specimen there was seen microscopically a sac-like structure completely surrounding each head. The shape of the structures varied, some being elliptical, others ovoid, still others approaching a spherical shape. Grossly, both the head and the sac can be seen in stained tissue. It does not seem likely that the adult worm could develop within the sac-like structure.

The tissues were stained several times with hæmatoxylin-eosin and also with methylene blue, but no nuclei could be seen. I felt that the structures might possibly represent the cercocyst stage of the dwarf tapeworm, thus indicating that man himself may be the intermediate host. The occurrence of auto-infection is proved by the large number of worms present and the difficulty in getting completely rid of them.

SUMMARY.

(1) A review of the literature shows that the dwarf tapeworm is the most common tapeworm in many parts of the United States.

(2) The first cases of *H. nana* from St. Louis are reported.

(3) A possible cercocyst stage of *H. nana* is demonstrated in man.

TREATMENT OF LEPROSY WITH THE DEAN DERIVATIVES OF CHAULMOOGRA OIL.¹

By J. T. McDONALD, A.M., M.D.

CHAULMOOGRA oil has been used in the disease for many years and is obtained chiefly from India, expressed cold from the nuts of a native tree of

several closely related varieties, the best being *Taraktogenos kurzii*. It was formerly used here in its crude state, often with some beneficial results. Attempts at this station to modify it by combining with it various drugs, such as camphor, resorcin, iodine and guaiacol, resulted in a measure of success that has since been described, and gave encouragement to the idea that a most valuable curative agent or active principle was there appealing to chemistry for its isolation or, at least, its identification.

In 1918 this station invited and fortunately secured, as college research work, the collaboration of Dr. A. L. Dean, president of the University of Hawaii, himself an expert chemist, who soon became intensely interested in the fascinating problem of extending the researches of Power and his co-workers into the field of therapeutics, and their practical application to the treatment of our patients in Kalihi Hospital. Power had shown that the chaulmoogric fatty acid series, chief of which are chaulmoogric acid and hydnocarpic acid, contain two unique properties: (1) They are optically active, rotating the plane of polarized light to a notable degree; and (2) their atoms are arranged in a closed five-carbon ring nucleus entirely different from any other known fatty acids. Here was an interesting and promising clue.

Dean originally separated the oil into four fatty acid fractions and then on account of their insolubility converted them into their ethyl esters, thus obtaining thinly fluid oils readily absorbable from intramuscular injection. The laboratory technique by which he effected this he has detailed elsewhere, and it need not be repeated here. A group of patients was placed on each of these, but after several months' trial, all doing equally well, the separation into fractions was abandoned in 1919, after we were convinced that the therapeutic agent was inherent in the entire fatty acid series rather than in any separated fraction, and also that its virtue remained unimpaired by any of the chemical or physical operations to which it had been subjected, such as its treatment with acid, alkali, alcohol, lead acetate, &c., or even the use of more than 200° C. of heat. At the same time we also entirely abandoned the Currie and Hollmann crude oil mixture for the new Dean derivatives.

Standard treatment then for weekly intramuscular injection became, and still continues to be, the ethyl esters of the entire fatty acids of the whole oil with 2 per cent. of iodine by weight chemically combined, the dosage of which begins with 1 c.c. and is increased by 1 c.c. at every second or third injection until we reach from 2 to 6 c.c. according to the age and weight of the patient. Internally, patients receive in capsule form the mixed fatty acids carrying 2.5 per cent. iodine in chemical combination; the fatty acids, rather than their ethyl esters, because they better conform to the normal digestive process which precedes fat absorption; we are therefore using by mouth a predigested oil or fat which is semi-solid

¹ Abstracted from *Journ. Amer. Med. Assoc.*, vol. lxxv, No. 22, November, 1920.

at room temperature, and, in capsule, very easy to take. Its dosage begins with $\frac{1}{2}$ grm. per 100 lb. of the patient's weight, three times a day, an hour or two after meals. This is gradually increased every two weeks until the maximum of 1 grm. per 100 lb. of weight per dosage is reached. Of these two forms of administration, we have gradually come to regard the injection as the vastly more important of the two. In fact we had ten patients on injections alone for several months, and they seemed to do as well as those who took both injections and capsules. It should be said for the fatty acids, however, that we consider them the most efficient form of the oil ever devised for internal use. We go for weeks at a time without a single complaint of digestive disturbance. We are sometimes asked why we add the iodine, but confess that we find ourselves unable to furnish an especially substantial defensive reason. It was used by our predecessors here, as also by others elsewhere, and was considered decidedly beneficial; it has an old and respectable reputation for effecting catabolic or retrograde metabolism, with a tendency to promote in the economy the absorption of inflammatory and hyperplastic products. Then, too, the fatty acids of chaulmoogra oil are unsaturated acids and therefore capable of taking up iodine to form chemical compounds having none of the irritating properties of free iodine. And yet we suspect we could well do without it. We have at present five patients on the ethyl esters of pure chaulmoogric acid and five on those of pure hydnocarpic acid without any iodine at all, and all ten seem to be doing as well as the others.

A valuable and timely contribution to the chemotherapeutics of chaulmoogra oil is that of Walker and Sweeney of the Hooper Foundation, proving conclusively what was foreshadowed by Dean, that the bactericidal agent, a hundred times more active than phenol (carbolic acid) in the effective destruction of the *Leptra bacillus*, is no other than that same unique five-carbon ring molecule in the structure of the chaulmoogric acid series. Thus have those skilled investigators absolutely proved by laboratory methods *in vitro* what I have been empirically demonstrating *in vivo* at this station for the last two years with the Dean derivatives.

A HOSPITAL TREATMENT.

Leprosy is such a slow, chronic disease, so insidious and sluggish in its attack and, heretofore at least, so stubbornly rebellious to therapy, that it taxes all the powers of patience and courage both of its victim and his medical attendant. Advantage has to be taken of every helpful measure for the maintenance of a steady, persistent and unflagging course of treatment which knows no faltering and no discouragement. As Dyer has aptly said: "Above all things individualize the patient; watch for improvement. If it does not show in three months, wait six months, wait a year or longer. Keep on driving at the treatment until the patient dies or gets well." And the only place for carry-

ing out this eminently wise and sound advice is a leprosy hospital, and best of all one like ours, maintained by the State, backed by a wholesome segregation law which precludes quitting and going home on the whim of the patient, as now obtains in asylums in the Orient.

We receive letters from all over the world from individuals asking for some of our remedies to "try," but our reply is that they are still in the experimental stage and not yet commercially available; that they constitute essentially a hospital treatment exclusively, where the patient is under constant observation and control; that they do not properly lend themselves to the practice even of the family physician; and that for self-administration they are absolutely impossible.

There is a wonderful power in association. A group of fellow leprosy hospital patients forget all about the prejudice and horror with which the outside world regarded them. Here, one is as good as another and no one is sensitive about his or her appearance, and they lead a far more happy and contented life than they possibly could outside. They watch each other, compare notes, see the old-timers getting paroled out; they see some improving more rapidly even if their own case is slow, so they go patiently on, whereas an isolated patient would get discouraged, give the treatment a black eye, and abandon it. An attack of leprosy fever, which often confines them to bed for several days, our patients endure with the greatest fortitude, because they have learned from observing fellow-patients that when they get over that flare-up they will be better than before. A private patient would say that his physician was poisoning him and would quit. Then too, the material itself can be made only by experts in a well-equipped laboratory. Both Dr. Dean and Professor Richard Wrenshall, head of the chemistry teaching staff, both of them Ph.D.'s of Yale in physiologic chemistry, have given months of intense study and enthusiastic experiment to it and have even procured special and costly apparatus for its manufacture. And yet I have had parties write to me for the prescription to have it made at the corner drug store.

It should therefore be distinctly understood and appreciated that our system of treatment here is one that cannot in its present stage of development be doled out indiscriminately at any price to isolated and private patients.

RESULTS.

Since October 1, 1918, there have passed the scrutiny of examining boards appointed by the Territorial Board of Health and been paroled as no longer a menace to public health seventy-eight patients, not one of whom has thus far shown the first sign of recurrence. There were thirty-six males and forty-two females. Their average age on admission was $23\frac{1}{2}$ years; there were forty-nine of the nodular type, twenty-four of the anæsthetic or neural, and five of the mixed; fifty-five were bacteriologically positive on admission, and twenty-

three negative; their average stay at the hospital under treatment was fifteen months.

COMMENT.

It should be stated that there is a widespread notion that the leprosy law of Hawaii, of which Brinckerhoff himself was one of the framers, reads that the Hansen bacillus must be demonstrated to establish a diagnosis; this, however, is an error; the law simply leaves the diagnosis to the judgment and opinion of a medical examining board. In 1903 I said: "The microscope is the supreme agent of the final diagnosis of leprosy. No patient should be committed to a segregated colony without a bacteriological demonstration of the disease. With a more mature experience, I have been obliged to modify this view. Leprosy was an established clinical entity ages before its causative bacterium was discovered. As I have shown above, in many unmistakable nerve cases its detection is also impracticable. Experts in tuberculosis often make absolutely definite diagnoses long before a single bacillus can be found in the sputum. In doubtful cases of both diseases, however, the finding of the bacilli is, of course, of the greatest diagnostic value.

Again, a greatly overworked symptom is the "bacteriologically negative" finding of authors reporting leprosy cures, as though a selected snip were a sample of the patient's skin, just as a sample of a few cubic centimetres in a test-tube determines the presence or absence of an albuminuria. A hundred skin tests might be made from old lesions without finding a single bacillus, because not one of the tests happened to be applied to a point at which any of those few remaining bacilli lay. Of infinitely greater value is, for instance, the finding on the site of a pre-existing nodule of a group of bacillary detritus which can be studied and which can give positive and definite information of the patient's status, whether there are any whole bacilli remaining or whether they are all broken and disorganized and scarcely able longer to retain the carbol fuchsin stain, and, in a word, are destroyed and dead. Here one has something definite on which to base a decisive opinion; finding nothing leaves one still in doubt and in the dark. A 14-year-old girl under our treatment for many months was one of our recent prospective parolers, the nodules on her face, the part originally affected, having entirely disappeared, leaving not even a stain. One especially prominent on entrance was on the right ala nasi, and from here a test slide was made. To our great surprise there were found here and there, among the debris of former bacilli, entirely healthy appearing ones of even stain and normal contour. Her name had to be struck off the list in spite of a disappointed mother in tears outside the gate. The child will remain some months longer, but will undoubtedly gain her parole in due time. Three others, adults, were stricken from our list for similar reasons. No one is ever recommended to the Board for parole until we are convinced from a careful study of all physical signs and symptoms that the disease is absolutely arrested.

TARTAR EMETIC IN GUINEA-WORM INFECTIONS.¹

By J. W. S. MACFIE.

TECHNIQUE OF TREATMENT.

EXCEPTING on rare occasions, the tartar emetic was administered in doses of 1 gr. each, and was given every other day. The injections were made into a vein at the bend of the elbow with a "Record" syringe and a fine needle. The strength of the solution employed, which was made up with normal saline solution and contained 0.5 per cent. phenol, was 0.5 gr. of tartar emetic in each cubic centimetre; this solution was found to be the most convenient and suitable for general use. The solution should always be freshly prepared before use. On one or two occasions (Cases Nos. 21, 22, 23) a stock solution which had been prepared two or three months previously was used, and was found to give disappointing results. Better results followed immediately in these cases when a freshly prepared solution was substituted. It is possible that some of the other less successful results in earlier cases may be accounted for in the same manner.

Many of the cases were treated as out-patients. Cases treated in hospital, where they were able to rest completely, appeared to do better however, and were sooner fit to return to their employments. This was most noticeable in patients in whom the worm had already set up a considerable degree of inflammation.

No serious ill-results were observed to follow the injections. In two cases, after 4 and 3 gr. respectively, a slight general papular rash developed, which, however, disappeared when the treatment was discontinued; and Dr. O'Brien reported that one of his patients showed symptoms of collapse after injection on one occasion.

EFFECTS ON THE GUINEA-WORMS.

Intravenous injections of tartar emetic will kill guinea-worms and the embryos in them. In one or two cases the effect has been observed on worms situated superficially and visible beneath the skin (e.g., Case No. 15, Plate II, figs. 1 and 2). In such cases the worm soon becomes stationary, and was slowly absorbed. The worms have also been examined microscopically at various stages of treatment by extracting small portions of them and searching them for embryos. Pieces of sixteen worms were removed and examined during the courses of antimony treatment, fourteen once only, and two on two occasions. Living embryos were found in worms after 2½, 3, 3, 4, 5 and 6 gr., after a previous course of 6 gr. and one recent dose of 1 gr., and after 10, 10 and 14 gr. of an old preparation which was probably not of full strength. Dead or disintegrated embryos only were found in worms after 4, 4, 4, 4, 4½, 5, 7 and 7 gr. The

¹ Abstracted from *Annals of Tropical Medicine and Parasitology*, vol. xiv, No. 2, June 22, 1920.

two worms which were examined in this manner twice showed living embryos on the first occasion, after 2½ and 4 gr., and only dead embryos on the second occasion, after 4½ and 7 gr. respectively. It is clear, therefore, that the same dose of tartar emetic does not always have the same lethal effect, some worms being killed, and their embryos with them, by 4 gr., others successfully withstanding larger doses.

From these results there can, I think, be no doubt that injections of tartar emetic will kill guinea-worms and their embryos; the results are, however, not always similar. Most frequently the worms remain in the body, and are gradually absorbed. In some cases the greater part of the worm remains in the body and is absorbed, but one or more pieces of dead worm slough before the wound becomes soundly healed. In other cases the worm appears in the wound, and can be extracted without difficulty or danger. So complete was my confidence in the efficacy of tartar emetic that during treatment I frequently pulled out and broke off protruding portions of the worms in order that the remainders might retract and permit of the healing of the external wounds. No ill-effects followed this practice, which under other circumstances would inevitably have resulted in acute inflammation and abscess formation.

In several cases the treatment appeared to have the effect of bringing to the surface other guinea-worms that happened to be in the body. The worms sometimes reached the skin surface alive (Cases Nos 15, 27), sometimes dead (Case No. 14), and sometimes they failed to make their way through the surface, and only succeeded in getting so far that they became palpable or produced local swellings.

EFFECTS IN REDUCING INFLAMMATION.

The injections of tartar emetic appeared to relieve inflammation as well as to kill the guinea-worms. So notable was this effect that it was thought that the treatment might prove of value in dealing with inflammation and suppuration due to other causes. No opportunity having yet occurred of putting this to test, it may be of interest to recount here briefly two of the cases in which this action appeared to be well marked.

Case No. 13 (see Chart).—This patient was admitted into hospital suffering from orchitis, and developed an abscess on the left side of his scrotum. The abscess was opened three times, nevertheless the inflammation and the fever persisted. At the third operation a guinea-worm was seen in the scrotum, and in consequence intravenous injections of tartar emetic were started next day. The fever subsided, the inflammation was arrested, and the wounds healed after the second injection.

Case No. 14.—This patient had a guinea-worm in the right foot, which was cured after the injection of 4 gr. of tartar emetic. A fortnight later a swelling appeared in the left groin and came to a head. It was punctured, about a drachm of pus was let

out, and a guinea-worm was seen. The guinea-worm was dead; no embryos were found in the discharge from the wound, and only disintegrated ones in a small piece of the worm removed for microscopical examination. As the worm and the embryos were dead, it was anticipated that the swelling would subside and that the wound would heal without special treatment other than that usually applicable to such an abscess. This did not occur immediately, however, and four days later intravenous injections of tartar emetic were restarted. The inflammation began to subside at once, and the wound healed rapidly.

Many other cases might be instanced in which the inflammation of the affected limb and the discharge from the guinea-worm sore appeared to respond immediately to intravenous injections of tartar emetic, but in some of them there was the possibility, not present in the two cases mentioned above, that the relief of the inflammation might have been due to the killing of living embryos which had invaded the tissues.

EFFECT ON THE DURATION OF THE INFECTION.

It is not possible to estimate accurately the reduction in the duration of the illness due to guinea-worm infections effected by the use of intravenous injections of tartar emetic because there are not available data showing the usual duration, and because, naturally enough, the length of the illness depends very largely on the condition of the patient on admission, the nature of the treatment previously adopted, the site of the worm, and on many other circumstances. Cases similar to those dealt with in this paper when treated by the older methods are generally reckoned, however, to be unfit for work for about six weeks, very much longer if a succession of worms develops.

In those of our cases in which the infection was single and was not complicated by some other affection, the average length of time from admission to discharge was about twelve days. In some cases it was less, in some considerably more.

It may be affirmed, therefore, that the treatment effects a real reduction in the duration of the illness, besides reducing the liability to the more serious consequences attending other forms of treatment.

THE DOSE OF TARTAR EMETIC REQUIRED.

Definite proof has, I believe, been obtained that the intravenous injection of 4 gr. of tartar emetic is sufficient in many cases to kill a guinea-worm and the embryos in it. This dose, however, is not invariably sufficient. It has been noted also that in the same patient, after one guinea-worm has been cured in this treatment, other guinea-worms may make their appearance at the surface of the body. These rather conflicting results suggest that all guinea-worms are not equally susceptible to the drug, and that either in certain stages of their development, or in certain situations in the body, they are less easily killed than when they have come

naturally to the surface for the purpose of discharging their embryos.

It may be suggested that to give every other day an injection of 1 gr. of tartar emetic until a total dose of 6 gr. has been administered would be found to be satisfactory treatment in most cases. In the event of relapse or recurrence, a second course should be given. Further experience may show that, in some cases at any rate, longer courses are necessary, and that it is preferable to augment both the individual and the total dose, but the cases collected in the table show that very satisfactory results may follow courses of as few as four or five injections of 1 gr. each.

A STUDY OF *BACILLUS PYOGENES*.¹

By J. HOWARD BROWN, Ph.D., and MARION L. ORCUTT.

INTRODUCTION.

Bacillus pyogenes is associated with various disease processes of swine and cattle and is not infrequently found in milk. Failure to recognize it as the *B. pyogenes* described in French, Dutch and German literature may be due to certain difficulties in its cultivation, to its close resemblance to streptococci under certain conditions, and to the fact that it is usually found in mixed culture with organisms which may mask its presence.

In France, according to Lucet (1893), next to the streptococci *B. liquefaciens pyogenes* is one of the most frequently found organisms in suppurations of cattle. In Germany, Künnemann (1903) found a similar organism, which he calls *B. pyogenes bovis*, in 90 per cent. of suppurations of cattle. Grips (1890) found *B. pyogenes suis* commonly present in pleuritis and peritonitis of swine. Tuff (1906) found *B. pyogenes* in over 13 per cent. of milk samples examined. Glage (1902-03) found the organism third in importance to streptococci and *B. tuberculosis* as a cause of mastitis in cows. Eggink is quoted by Ward (1917, a) as having found *B. pyogenes* of first importance in metritis of cattle. There are no statistics as to the prevalence or distribution of the organism in America. Ward (1917, a) found it frequently in swine and cattle. Lucet (1893) studied fifty-two cases of suppuration, cold abscesses, traumatic abscesses, and cases of septicæmia, all in cows. He says: It seems that there exist in the cow special pyogenic microbes, not yet described, which are a streptococcus, a staphylococcus, and three bacilli. He names these organisms *Streptococcus pyogenes bovis*, *Staphylococcus pyogenes bovis*, *B. pyogenes bovis*, *B. liquefaciens pyogenes bovis*, and *B. crassus pyogenes bovis*. His description of *B. liquefaciens pyogenes bovis* agrees with that of the *B. pyogenes* of Grips, Glage, Künnemann, and others. Lucet gives a photograph of the organism and describes it as non-motile, liquefying gelatine slowly, not growing on

potato, growing as a sediment in veal bouillon without producing turbidity, non-virulent for guinea-pigs, injected into rabbits intravenously producing subaponeurotic abscesses principally in the limbs, where they sometimes acquire great size but do not discharge. His *B. pyogenes bovis* resembled the above morphologically but did not liquefy gelatine, and its pathogenicity for guinea-pigs was variable. *B. crassus pyogenes bovis* was a larger motile bacillus. Grips (1893) described *B. pyogenes suis* and the lesions of the pleura and peritoneum from which it was isolated. Poels (1899) described a similar organism from polyarthritis of calves and called it *polyarthritis bacillus*. Künnemann (1903) described *B. pyogenes bovis* from suppurations of cattle. Glage (1902-03) made a careful comparison of *B. pyogenes suis* (Grips) and *B. pyogenes bovis* (Künnemann) and concluded that they were identical. He proposed that the organism be called *B. pyogenes*. His contention that the organisms from swine and cattle are identical has not been seriously questioned. Careful bacteriological studies have been made by Koske (1906), Berger (1908) and Holth (1908). Ward (1917, a and b) has given valuable brief summaries in English, and Glage (1913) in German.

CULTURAL STUDY.

The known morphological and cultural characteristics of *B. pyogenes* as described by Lucet (1893), Grips (1898), Poels (1899), Künnemann (1903), Glage (1902-03), Koske (1906), Berger (1908), and Holth (1908), have been summarized by Glage (1913), Buchanan and Murray (1916), and Ward (1917 b). They are briefly as follows:—

The organism is a small slender rod 0.2 to 3.0 microns in length by 0.2 to 0.3 microns in thickness. It is quite pleomorphic, being often coccoid, club-shaped, or slightly curved. It is non-motile and produces no spores. Some authors (Glage, Künnemann) have regarded it as Gram-negative and others as Gram-positive (Berger, Holth, Olt, Ward). Berger found it Gram-positive if subjected to sufficient exposure to the iodine solution. Capsules are not produced. It is stated by most authors that the organism grows very poorly or not at all in standard bouillon or on standard agar, and that it requires hæmoglobin, blood, or serum in the medium. Good growth occurs on blood or serum agar. Coagulated blood serum is slowly liquefied, beginning in about forty-eight hours as small depressions underlying each colony. Because of this characteristic this medium has been a favourite one for isolating the organism. Milk is coagulated in about forty-eight hours and the curd is subsequently slowly dissolved or digested. In liquid serum or serum bouillon growth occurs in the form of a sediment. Growth does not occur at temperatures below 24° C., but in a specially prepared nutrient gelatine of high melting point Poels found liquefaction produced by the organism growing at 26° C. Growth occurs under aerobic and anaerobic conditions. Gas is not produced in carbohydrate media. According to Pütz (1904) acid is produced. Koske (1906) reports acid production in serum litmus

¹ Abstracted from the *Journal of Experimental Medicine*, vol. xxxii, No. 2, August 1, 1920.

whey. Berger (1908) obtained no growth in serum litmus whey and does not mention acid production in lactose or dextrose bouillon but notes that milk is coagulated and soured. Holth (1908) reports acid production from dextrose, fructose, galactose, maltose, lactose, and saccharose in a special meat extract (Cibil's) bouillon but obtained no acid or visible growth in the same medium containing xylose, rhamnose, arabinose, sorbose, mannitol, sorbitol, dulcitol, or glycerol. Indole, hydrogen sulphide, and nitrites are not produced. Methylene blue, litmus, and neutral red are not reduced. The bacillus is soon killed at 57° C, and is very sensitive to antiseptics.

Our experience with the organism agrees with the above as regards morphology, oxygen requirements, growth on coagulated serum, in milk, and in serum bouillon. In plain standard veal infusion bouillon made with Fairchild's peptone, however, we have obtained fairly good growth, at least with strains which have been in cultivation a very short time. For a while the bouillon was not clouded by the culture but after cultivation for several months bouillon was distinctly clouded in twenty-four hours by most strains. The production of hæmolytic in blood agar by *B. pyogenes* appears not to have been noted heretofore. In standard veal infusion agar plus 5 to 10 per cent. of defibrinated horse blood there appears after incubation for twenty to twenty-four hours very small zones of hæmolytic about very minute deep colonies. The colonies are often visible only under the low power of the microscope. In forty-eight hours the deep colonies are still quite small biconvex discs about 0.3 mm. in greater diameter but are easily seen macroscopically. The hæmolytic zones are clear, well defined, colourless and of the beta type (Smith and Brown, 1914-15; Brown, 1919) about 1.5 to 2 mm. in diameter. Isolated surface colonies do not appear so readily on the plate under aerobic conditions and the zone of hæmolytic may be hardly visible. If the plate is sealed, however, individual surface colonies grow more readily and produce zones of hæmolytic similar to those of deep colonies. If the blood agar plate is streaked so that many small surface colonies appear in the line of the streak, hæmolytic appears beneath the streak. The individual surface colonies are very small convex colourless droplets much like those of *B. influenza*.

RESEMBLANCE TO OTHER ORGANISMS.

Classification.

The close resemblance of *B. pyogenes* to streptococci has been mentioned above. This is especially true of some strains when grown on certain media, a resemblance so close that the bacteriologist working with milk or animal diseases must be on his guard not to confuse them. *B. pyogenes* produces laking of a suspension of blood or blood corpuscles in salt solution as do the hæmolytic streptococci of human origin (Brown, 1920). Its limiting hydrogen ion concentration in dextrose bouillon would also mislead one to place it among the human streptococci (Avery

and Cullen, 1919). On the other hand, *B. pyogenes* liquefies coagulated blood serum and is distinctly diphtheroid at times. Morphologically, therefore, it may be one of the diphthero-streptococci now and then described. Such organisms are occasionally isolated from human lesions, especially pneumonias, and though *B. pyogenes* has never been identified in man, it would be well for bacteriologists to keep it in mind. Since it is found in several species of animals and is widely disseminated in milk it may be that there are rare cases of human infection.

There is also in animals a group of small Gram-positive organisms closely resembling *B. pyogenes* morphologically and culturally. We have studied two such strains from the livers of calves and one from the lung of a hog. The strains from calves were apparently alike, and had the same fermentation reactions as *B. pyogenes*. They were cultivated with greater difficulty than the latter, however. They grew best under partially anaerobic conditions and would not grow in serum-free media. There was no apparent growth in milk. Gelatine and coagulated serum were not liquefied and growth on the latter was scarcely visible. There was very little laking of horse blood in agar plates. A rabbit was repeatedly injected intravenously with several cubic centimetres of serum bouillon cultures of one of these strains with no ill effects. Serum from this rabbit precipitated precipitinogens of both of these strains in dilution of 1:80 or 1:160 but produced no precipitation of the precipitinogens of strains of *B. pyogenes*. Neither did *B. pyogenes* antisera precipitate precipitinogens of these two strains.

A strain from a hog also resembled *B. pyogenes* morphologically. It differed from *B. pyogenes* and the other two strains just described in that it fermented salicin. It resembled the two strains from calves in failing to liquefy gelatine or coagulated serum but grew much better than those strains. No visible change was produced in milk but sufficient acid was produced so that when the culture tube was placed in boiling water the milk was coagulated. An indefinite zone of hæmolytic was produced in the blood agar plate.

Glage (1913) points out a certain resemblance of *B. pyogenes* to the bacillus of swine erysipelas. Morphology, growth in gelatine, and the lesions produced in hogs and small experimental animals serve to differentiate the two.

Dunkel (1908) thought that *B. pyogenes* could be transformed into *B. pseudotuberculosis ovis* by animal passage and therefore regarded the two as of the same species. The two are certainly not alike when studied as isolated from their respective hosts. The dry colonies described as characteristic of *B. pseudotuberculosis*, pigmented colonies on coagulated blood serum, and failure to produce change in milk are not at all like *B. pyogenes*. There may be some morphological resemblance.

Priewe (1911) and Glage (1913) have claimed that *B. pyogenes* belongs to the influenza bacillus group for the following reasons: hæmoglobinophilic habit, form, size, non-motility, lack of spores, abundance in green pus, growth at high temperature only, and slight

virulence for small laboratory animals. Priewe claimed that a *B. pyogenes* antiserum agglutinated *B. influenza*. We have not tried to repeat the latter observation. However, we do regard it as well established that *B. pyogenes* is Gram-positive and that it is not hæmoglobinophilic. The other characters enumerated by the above authors are common to so many and dissimilar organisms that they are of little value as evidence of relationship of these two organisms. *B. pyogenes* does not have the foul odour characteristic of *B. influenza* and the two do not produce similar lesions in rabbits. Grips (1903), Grips, Glage and Nieberle (1904), and Priewe (1911) have regarded swine plague as due primarily to *B. pyogenes* with *B. suis* as a secondary invader. They regard the primary infection as a "Tierinfluenza." The views of these authors have not been accepted by others. Olt (1904) has criticized them thoroughly but asserts that many of the lesions characteristic of chronic swine plague are due to *B. pyogenes*.

The forms assumed by *B. pyogenes* bear a striking resemblance to those of *Asterococcus mycoides* described by Borrel, Dujardin-Beaumetz, Jeantet, and Jouan (1910) as the cause of bovine pleuropneumonia. The latter organism is, however, much the smaller. The work of the authors mentioned is almost wholly morphological and the result of staining by Gram's method is not mentioned. Buchanan (1918) however places *Asterococcus* in the Gram-negative subtribe *Hæmophilina*. The other genus of this subtribe is *Hæmophilus*, of which the type species is *Hæmophilus influenza*, the influenza bacillus of Pfeiffer. Since Buchanan and Murray (1916) describe *B. pyogenes* as a member of the hæmophilic or influenza group they presumably classify it also in the subtribe *Hæmophilina*, where it can hardly belong in view of its being Gram-positive. Preisz (1906) regarded *B. pyogenes* as one of the "Corynebakterien." We are more inclined to place it in the genus *Corynebacterium* as defined in the Preliminary Report of the Committee of the Society of American Bacteriologists on Characterization and Classification of Bacterial Types (1917) than in the so-called influenza group.

SUMMARY.

B. pyogenes is probably quite common in this country, as it is known to be in Europe.

A careful study of twelve strains from cattle and one from a hog has disclosed the following characteristics which have not been reported or have been in dispute.

B. pyogenes is Gram-positive and pleomorphic, producing forms ranging from short chains of streptococoid elements to branching filaments.

It is hæmolytic, producing the best type of hæmolysis in blood agar. It is not hæmoglobinophilic, though its growth is greatly favoured by some higher protein material such as egg albumen, serum or blood.

It ferments xylose in addition to the substances previously reported.

The coagulation of milk by *B. pyogenes* is primarily an enzyme coagulation and the subsequent digestion of the curd takes place in an acid medium. The

intravenous injection of rabbits was invariably fatal. The lesions most commonly developed were those of the bones. Paralysis was frequently produced, and in each case was caused by lesions in the vertebrae exerting pressure against the ventral columns of the spinal cord. Muscle abscesses were also frequently produced. The authors regard the organisms as belonging to the *Corynebacteria* rather than to the influenza group.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.

Note on an Unclassified Disease of the Horse in Morocco (H. Velu and Balozet).—The horses are attacked only between the months of May and October. The first symptom is generally intestinal trouble, followed by fever lasting from five to eight days, during which the temperature rises to 40.5° or 41° C., and the animal suffers from somnolence, prostration and complete loss of appetite, the mucosa is sub-icteric, the eyes markedly bloodshot, and there is considerable anaemia and weakness. As the fever falls the symptoms become less severe, but the pallor of the mucosa and the weakness remain. During the subsequent attacks of fever (there are usually three or four), which occur at intervals varying from eight days to two and a half months, the rise in temperature is less acute, and the symptoms generally milder. The prognosis is favourable. When the termination is fatal, autopsy shows extreme pallor of all organs. The body is greatly emaciated. The conjunctivæ are yellowish-white, and covered with ecchymoses if death has occurred during a violent attack of fever. The spleen is hypertrophied, the liver nearly always cardiac, often sclerous and engorged with blood. The kidneys show an interstitial nephritis with more or less extensive sclerosis of the medulla and cortex. The heart is frequently hypertrophied, the walls of the ventricles flabby, and the valvulæ thickened at the edges. Microscopic examination of the organs is negative. Neither spirilla, filaria nor piroplasma have ever been found in the blood, and the disease is not transmissible to dogs, guinea-pigs, or white rats. No case of direct contagion has been observed. As regards treatment, the various forms of arsenic have proved ineffective.

As a large number of animals are attacked, and the symptoms and geographical distribution of the disease are identical with those of trypanosomiasis, the author remarks on the necessity for great care in diagnosis, seeing that the former is of a much less serious character than the latter. The only certain means of differentiation is by inoculation into dogs.

Treatment of Blackwater Fever by Intravenous Injections of Cyanide of Mercury (J. Pelletier and Quemener).—In view of Noc's agreement with Shüffner's opinion that the ætiological factor in

blackwater fever is a spirochæte, the authors have acted on Munoz's suggestion to treat the disease by intravenous injections of 1 cg. of cyanide of mercury every twenty-four hours, and report six cases of various types treated successfully by the method indicated, assisted by rectal drip injections of a sugar and adrenalin solution.

On the Presence of Schistosomum mansoni Eggs in the Stools of Clinically Healthy Individuals in Madagascar (G. H. Morin).—Aware that *Schistosomum mansoni* was well known to exist in Madagascar, the author was nevertheless surprised to find by experiment how frequent it was among the natives of the low-lying portions of the east coast, and how remarkably (apparently) innocuous. The stools of 394 individuals, tested once only per person, showed the parasite fifty-one times (i.e., 12 per cent.). The majority of the examinees were candidates for the Army, and many of them were of more than average height and strength. The origin of the contamination was impossible to discover on account of the wandering habits of the people. The general parasitic index (eggs of ascaris, trichocephalus, ankylostoma, &c.) was in the neighbourhood of 100 per cent.

The Heredity of Experimental Schizotrypanum cruzi Infections (L. Nattan-Larrier).—Experiments on twenty-six female laboratory animals (twenty-five guinea-pigs and one mouse) have led the author to the conclusion that Chaga's disease may be transmitted from the mother to the fœtus. A very active virus was used, and the animals were generally inoculated under the skin or in the muscles—rarely into the peritoneum. Out of the twenty-six experiments there were nineteen abortions, occurring at all periods of gestation, but principally within twenty days after inoculation. In two instances trypanosomes were found in the stillborn young of infected mothers; inoculation into mice of an emulsion from the organs of the former, however, produced negative results. Amniotic fluid from two infected mothers was injected into mice and trypanosomes recovered; in two other cases the infection was not reproduced. The author proposes to deal with the problem as to how the trypanosome enters the placenta in a subsequent paper.

Contribution to the Study of the Therapeutic Results afforded by the Administration of Atoxyl in Human Trypanosomiasis (P. Clapier).—A large number of natives of Lower Oubangui, suffering from declared or suspected trypanosomiasis, were given prophylactic doses of atoxyl in 1913 and 1914, and then, owing to the war, were not again visited until 1920-21. After the six years' interval 373 individuals have been re-identified out of a total of 1,078, 538 have died, and 167 disappeared; in 80 per cent. of the rediscovered cases examination has revealed an entire absence of parasites. The total percentage of complete recoveries is therefore twenty-eight—a figure which might have been considerably larger but for the epidemic of influenza

in 1918, which in some districts carried off from 8 to 9 per cent. of the entire population.

Intestinal Helminthiasis and Schistosomum mansoni Bilharziasis in Madagascar (Marcel Leger and Ernest Pringault).—One hundred and fifty young natives of Madagascar, treated for various conditions in the Marseilles military hospital, were examined for intestinal parasites, and 114 (76 per cent.) were found to be infested with one species or more. Ascaris was seen eighty-five times, ankylostoma fifty times, and trichocephalus forty-six times. Neither oxyuris eggs nor *Strongyloides stercoralis* were observed. The ankylostoma eggs belonged both to the *Necator americanus* and *Ankylostomum duodenale* species, but the former was much more frequent than the latter. Fourteen of the men were infected with *Schistosomum mansoni*, either alone or in association with the other parasites mentioned. Proposals for preventing the spread of ankylostomiasis and bilharziasis have been submitted to the authorities responsible for the importation of colonial troops, and steps are being taken to ascertain to what extent the snails in the Marseilles district are likely to aid in the propagation of *S. mansoni*. The conditions in France would appear to be unfavourable to the dissemination of *A. duodenale*, but whether they may affect *N. americanus* in the same way remains to be seen.

Medical News.

LONDON SCHOOL OF TROPICAL MEDICINE.

THE following candidates have passed the examination of the school at the termination of the 66th Session, May-July, 1921:—

With Distinction.—Surg.-Comdr. S. Dudley, R.N. (winner of "Duncan" and "Laloea" Medals); Dr. K. S. Nigam; Flight-Lieut. T. C. Merton, R.A.F. Med. Ser.; Dr. A. A. Vardon; Capt. J. P. Litt, R.A.M.C.; Dr. Lee Se Liat; Dr. J. Kilian Clarke; Dr. E. A. Gandhi; Dr. E. T. C. Stedeford; Wing-Comdr. H. M. Stanley Turner, R.A.F. Med. Ser.

Passed.—Dr. H. C. Sinderson; Major W. B. Borden, U.S. Army; Surg.-Comdr. S. Roach, R.N.; Dr. A. M. Walcott; Dr. J. Singh; Dr. R. Runter; Dr. F. Dahlerup; Dr. W. Milne-Tough; Dr. L. B. Perry; Dr. B. M. Bharucha; Dr. E. J. Clarke; Dr. R. L. Symes; Dr. J. A. Anklesaria; Capt. B. M. Antia, I.M.S.; Dr. L. W. Barlow; Dr. S. N. Bardham; Dr. J. C. Callanan; Dr. H. G. Holbrook; Dr. E. Matthai; Dr. W. G. McClintock; Dr. J. S. Nicolson; Dr. A. C. Paterson; Dr. P. Popoff; Dr. W. S. Ratnavale; Dr. J. A. Ross; Dr. A. D. Soares; Dr. R. H. Turner; Dr. S. de Vos; Major N. M. Wilson; Dr. J. Grell; Dr. P. R. Lentini; Dr. Hassan A. Soud.

Original Communications.

THE ÆTIOLOGY OF GANGOSA AND ITS RELATION TO PAPULO-CIRCINATE YAWS.

By FERDINAND SCHMITTER, M.D.

GANGOSA.

DURING the last decade the attention of the medical profession has been attracted to the subject of gangosa mostly by the writings of naval surgeons at Guam.

Fordyce [1], 1906, reported a case which did not respond to anti-syphilitic treatment. Arnold, who had been at Guam, commented on the subject. Both authors were inclined to believe it a clinical entity, neither yaws nor syphilis.

Leys [2], 1906, says: "No evidence has yet been adduced to warrant our regarding it as a late manifestation of yaws or of any other constitutional disease, but that it is more probably a peculiar and independent local disease."

Branch [3], 1906, says that gangosa should be considered syphilis until proved otherwise. He found spirochætae other than pallida in scrapings from ulcers.

Mink and McLean [4], 1906 and 1907, believe from observations that it is neither syphilis nor yaws, but an undetermined specific infecting agent. Potassium iodide in long-continued large doses seemed to have no effect.

Musgrave and Marshall [5], 1907, report a case which failed to yield to potassium iodide and mercury. Levaditi sections from autopsy failed to show spirochætae.

Howard [6], 1908, believes that rhinopharyngitis and other ulcerations may "reasonably be attributed to tertiary yaws."

Geiger [7], 1908, believes that gangosa is rhinoscleroma. He found a bacillus which he believes to be an ætiological factor.

Garrison [8], 1910, says: "From a clinical, and particularly from a therapeutic standpoint, it is syphilis in a very late form."

Brienl [9], 1910, describes ulcerative mutilations of rhinopharynx, and is "inclined to consider" them "as a peculiar manifestation of syphilis."

Bachmann [10], 1910, observed cases of gangosa in the Fiji Islands which the doctors there regarded as a form of yaws. They improved on mercury and potassium iodide.

Phalen [11], 1910, from clinical observations believes gangosa and other chronic ulcerations due to yaws plus secondary infection.

Montague [12], 1910, from histories of cases in Fiji, where he saw no syphilis in nine years, believes that gross ulcerations of the nasopharynx and other parts are due to "long antecedent frambæsia."

Stitt [13], 1910, in a case clinically resembling rhinopharyngitis mutilans found the spirillum and fusiform bacillus of Vincent's angina.

Odell [14], 1911, used anti-syphilitic treatment

with such good results that he concluded it "therapeutically to be syphilitic in nature." Crow did Wassermann's on 100 of Odell's patients and found 82 per cent. positive.

Rossiter [15], 1911, reported "a case resembling gangosa in which a treponema was found." The patient was a child of 2 years, and Giemsa's stain was used on smears from the ulceration.

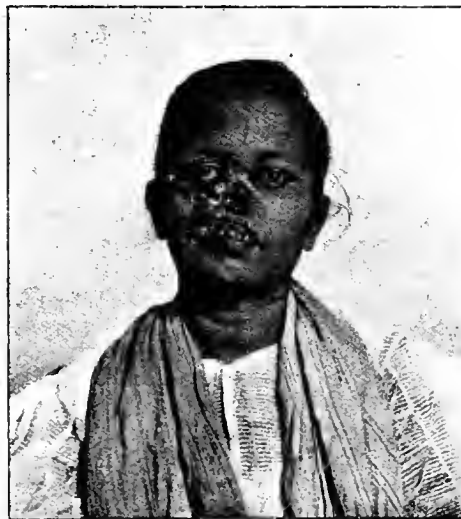
Leber [16], 1912, says Baermann and Schüller considered gangosa due to frambæsia, and he agrees with them, reporting a case of gangosa in which there were still yaws papules.

Halton [17], 1912, from complement fixation, history and therapeutic findings, believes that gangosa is a tertiary lesion or sequel of yaws.

Kerr [18], 1912 and 1913, found that 85 per cent. of 315 cases had had yaws, and that yaws existed in the family of almost every case. He concludes: "That yaws is an antecedent factor in gangosa. That yaws is responsible for the positive serum reactions which have been obtained in gangosa. . . . Salvarsan . . . was used . . . with as surprisingly efficacious results as attend its use in the treatment of syphilis."

Castellani and Chalmers [19] consider the affection to be probably a late manifestation of yaws.

In investigating this subject two cases of gangosa were observed at San Lazaro Hospital, Manila. Both gave positive double-plus Wassermann reactions. Both patients gave histories suggestive of yaws.



CASE 2.—After treatment. (Seven weeks after beginning treatment.)

Case 1.—Filipino, aged 33; always lived in Tayabas province. About 1½ years ago an indolent sore appeared on the dorsum of the right hand. The lesion healed in about a year, but while it was healing the nasal ulceration developed and progressed for about a year, destroying the nose and adjacent tissues. For two months the ulcers have all been healed over making it impossible to find

treponemata. He was given salvarsan and mixed treatment which improved his general condition.

Case 2.—Filipina, aged 34; always lived in Manila. Her husband gave a negative Wassermann reaction. Ten years ago a granule appeared on her upper lip. From it the sore spread to the nose, which was destroyed with the adjacent tissues. The disease progressed for eight years and has been stationary for the past two years. When first observed she had three ulcers, each about an inch in diameter, at the inner extremity of the right eyebrow, at the outer angle of the right eye and at the right-angle of the mouth. These lesions were healed in two weeks after salvarsan and mixed treatment were begun.

Dark-field examinations were made of the serum from the surface and scrapings from the base of each ulcer and found negative except for one large manifestly non-specific spirochæte. Then tissue was clipped from the margins of the ulcers and crushed in salt solution, by which means innumerable treponemata with the tight spiral or cork-screw morphology of *S. pallidum* and *S. pertenuis* were demonstrated with the dark field.

A search of the literature fails to show any positive findings heretofore. Several authors record examinations with negative results, the only suggestive finding being that of Rossiter mentioned above.

MUTILATING LEG ULCERS.

Two cases were observed at San Lazaro Hospital.

Case 1.—Filipino, aged 31. He gave a history of a primary lesion near the right knee. On both shins were deep symmetrical ulcerations, each about 3 × 5 in. His Wassermann reaction was double plus. Salvarsan, followed by mixed treatment and blue ointment locally, caused rapid healing. After two months the lesions were entirely healed.

Case 2.—Filipina, aged 26. She gave a history of a primary lesion on the right calf. She had deep scars about both elbows from healed ulcers. Both legs were ulcerated to the shin bones almost from ankles to knees. She was treated with salvarsan, mixed treatment and blue ointment. The lesions were almost healed in two months. Tissue clipped from the edge of the ulcer, crushed in salt solution and examined by the dark field, showed numerous spirochæte with the corkscrew morphology of *S. pallidum* and *S. pertenuis*. Levaditi sections of the same tissue also showed the typical cork-screw-type spirochætæ.

The uniform likeness of these gangosa and leg ulcer cases makes it appear that they are one and the same disease. Between the two there are no distinguishing features, but, on the contrary, they have the following essentials in common:—

- (1) History of previous lesion analogous to chancre or primary yaws.
- (2) Positive Wassermann reaction.
- (3) Same type of treponemata in ulcer margins.
- (4) Therapeutic results. The healing seemed much more prompt than could be secured in similarly extensive lesions of syphilis.

Granting that gangosa and these leg ulcers are the same treponematosus disease, we are still confronted with the question: Are they syphilis, yaws, or a third spirochætal disease? The disposition to attack the shins and nose is strikingly like some cases of syphilis. The history in each of the above four cases was of an extra-genital papule without secondaries. None of them showed any of the round discrete scars which so often follow raspberry yaws. They therefore resemble mostly papular yaws, sometimes called by the hybrid name, "syphilitic yaws."

For comparison with the above, four cases of yaws were studied.

YAWS.

Case 1.—Filipina, aged 50. She had large papules and elevated ring lesions all over her face, body and limbs, but no ulcerations. This is the type of the disease sometimes called "ringworm yaws." The lesions subsided in a week after the administration of 0.3 gm. of salvarsan. Before treatment bits of tissue were taken from the margin of a ring lesion on her arm. Levaditi sections showed great numbers of treponemata of the same morphology as gangosa.

Cases 2, 3 and 4 were three cases of raspberry yaws, all very much alike and in young men. In each of them delicate spirochætæ of *pertenuis* type were found with the dark field.

SUMMARY.

In three cases of frambæsia, or raspberry yaws, the uniformly fine corkscrew type *S. pertenuis* was regularly found.

In one case of papulo-circinate "ringworm" or "syphilitic" yaws—as sometimes called—a coarse corkscrew spirochæte was found in the non-ulcerated lesions.

In two cases of ulceration, one gangosa and one of shins, spirochætæ were found of the same coarse corkscrew type as in papulo-circinate yaws.

Near Manila gangosa and papular yaws are rare, although there are plenty of raspberry yaws.

I am informed that in Guam, where gangosa is common, papulo-circinate yaws is prevalent, while raspberry yaws is not to be found.

All this suggests that papulo-circinate yaws—sometimes called ringworm yaws—may be a separate variety of disease from frambæsia, also called raspberry yaws, and that gangosa and similar tropical ulcerations constitute a late stage of said papulo-circinate yaws.

All this suggests that there may perhaps be two varieties of frambæsia: the usual one, raspberry yaws, and a less common one, ringworm yaws, and that gangosa is probably a late manifestation of the latter.

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BLACKWATER FEVER IN THE SOLOMON ISLANDS.

By NATHANIEL CRICLOW, M.B., Ch.B.(Glasgow).
Government Medical Officer, British Solomon Islands Protectorate.

BLACKWATER fever can be defined as an acute specific fever of unknown origin, characterized by great destruction of the red cells of the blood, and evidenced by the passage of very dark or reddish urine.

Until recently blackwater fever was unknown in the British Solomon Islands, but of late it has been comparatively common. In the past eleven years the deaths from this disease were as follows:—

Year	Total number of deaths in Protectorate	Deaths from blackwater fever	Percentage
1910	—	0	—
1911	—	0	—
1912	5	1	20
1913	—	0	—
1914	—	0	—
1915	—	0	—
1916	8	2	25
1917	6	4	66.6
1918	—	0	—
1919	7	2	28.6
1920	6	3	50

The mortality from blackwater fever is high, as most of the cases do not come under skilled medical treatment.

Thus it will be seen from the above table that blackwater fever was rare before the year 1916, and that during the past ten years, out of a total of twelve deaths from blackwater fever, 91.8 per cent. of the deaths occurred since that year.

What is the cause of this increase of blackwater fever during the past four years? Whatever the real cause may be, the following factors have operated:—

- (1) The increase of the European population.
- (2) The injudicious use of quinine.
- (3) Repeated attacks of malarial fever and the incomplete treatment of the same.

I firmly believe that blackwater fever is a disease introduced into the British Solomon Islands.

Previous to the year 1916, malarial fever was as

prevalent and the treatment adopted was the same, yet blackwater fever was practically unknown. Consequently it would seem that some other factor—the real agent—has operated since 1916.

During the year 1920 there have been to my knowledge nine cases of blackwater fever. Of these cases, four were diagnosed as such by medical men; the remaining five cases were returned as blackwater fever by laymen.

Of the nine cases, four were medically treated, three of them at the Government Hospital, Tulagi, of which I am at present in charge, and one at the Government Hospital, Rabaul, New Britain. All four cases recovered.

Of the five untreated cases there were three deaths. Consequently the percentage of deaths among the untreated cases can be estimated at 60 per cent.

Etiology.—The causation of blackwater fever is at present unknown.

Of the various theories regarding the causation, without going into a lengthy discussion, in support of the malarial theory, it has been stated by Sir Leonard Rogers in the *Medical Annual* for 1920 that "recent experience in the war areas has completely confirmed the now generally accepted view that this (blackwater fever) is but a complication of malaria."

Against this theory are the facts that blackwater fever has occurred in non-malarial subjects, the malarial parasites are generally absent, and that cases recover without any quinine being administered.

If blackwater fever is but a complication of malaria, why is it that in the British Solomon Islands the condition was rare and practically unknown before the year 1916?

One fact must be mentioned in support of the malarial theory. The prevailing type of malarial fever in the British Solomon Islands is the benign tertian type, but of late the subtertian type is becoming comparatively common.

Against the quinine theory can be cited the fact that large doses of quinine have been administered in cases of blackwater fever without increasing the hæmoglobinuria. There are individuals in the British Solomon Islands who take as much as 60 gr. of quinine daily during a malarial attack without developing a hæmoglobinuria. Quinine hæmoglobinuria undoubtedly does occur, but these cases are uncommon.

An interesting case may be mentioned. Blackwater fever is unknown among the natives. I, personally, have never seen a case.

A teacher of the South Sea Evangelical Mission told me of a very interesting case of hæmoglobinuria in a native. If this native took during a malarial attack as small a dose as 5 gr. of quinine, he developed a hæmoglobinuria.

With regard to the combined malarial and quinine theory, Stephen sums up his view of this theory in Osler's "System of Medicine" as follows: "Blackwater fever is not a disease *per se*,

but rather a condition of blood in which quinine, other drugs, cold, or even exertion may produce a sudden destruction of red cells. The condition is produced only by malaria and generally by repeated slight attacks, insufficiently combated by quinine. In such cases of chronic malaria—i.e., in those suffering from anæmia, with repeated attacks of fever and repeated doses of quinine—blackwater fever sooner or later almost supervenes—at least, in tropical countries.”

If this view of Stephen is correct, then blackwater fever should attack practically the whole of the European population here. Gaskell states in a paper published in the *Annals of Tropical Medicine and Parasitology*, an extract of which appeared in the *British Medical Journal* of July 24, 1920, “that blackwater fever is held to be due to a sudden hæmorrhage in the blood-stream, brought about in certain cases of chronic malaria by the administration of quinine; exposure or exhaustion is often a contributory factor.”

In the same paper Gaskell summarized the conclusions of the Panama Canal Commission as follows: “Blackwater fever only occurs when a population not immune to malaria becomes exposed to extensive infection by it, when relapse and re-infection are therefore common, and owing to the unfavourable conditions proper quinine treatment has not always been obtainable.”

Most of the cases of blackwater fever that have occurred in the British Solomon Islands can be explained by the malarial-quinine theory, as the history in the majority of cases conformed to the picture depicted by Stephen and Gaskell.

But against this theory can be cited the facts that blackwater fever has occurred in persons without a previous attack of malaria and that new residents are attacked.

In a notably malarial country like India, we find that in certain parts, e.g., Ceylon, although malarial fever is widely prevalent, blackwater fever is rare.

In the British Solomon Islands the same conditions prevailed previous to the year 1916, and yet blackwater fever was practically unknown.

I hold the view that blackwater fever is a disease caused by some unknown agency and that malaria and quinine are only predisposing causes. If the causative agent is absent, even if the conditions necessary as depicted by Stephen and Gaskell are present, blackwater fever will not occur.

Amongst other predisposing causes are chills, exhaustion and alcoholism. Of the nine cases that occurred during the year 1920, five were heavy drinkers.

These facts may have some bearings upon the ætiology of the disease:—

A nurse of the Melanesian Mission developed blackwater fever and died from the disease. Three years later another nurse living in the same house developed the disease.

Again, a plantation manager developed blackwater fever. Two years later a lady living in the same house developed the disease.

A planter had an attack of blackwater fever. On his recovery he went to Australia to recuperate his health. During his absence he left a gentleman in charge. This gentleman died under unfortunate circumstances. He was only attended by natives, and they assert that his urine was red previous to his death.

The planter returned to the same locality and lived in the same house in which he contracted his previous attack. Soon after his return he developed a second attack and nearly died from the disease. He was timely removed to the Rabaul Hospital and recovered.

In two deaths from blackwater fever it was reported that decomposition set in within two hours of death.

Length of Residence.—If a state of chronic malaria is necessary for an attack of blackwater fever, then the disease should be rare in Europeans within the first year of residence, but cases have been reported where individuals have been attacked within two or three months of arrival, and persons have developed the disease without a previous attack of malaria.

In the British Solomon Islands during the year 1920, two individuals were attacked within the first year of residence, one within five months of arrival, the other within nine months of arrival. Both cases were untreated and died.

Daniel states that few cases occur during the first six months of residence, that they rapidly increase during the next six months, are most numerous during the second and third year, and become rare after five years' residence. But analysing the cases that have occurred in the British Solomon Islands, I find that six cases have occurred in individuals after a residence of five years. Two of these cases died.

During the year 1920 the length of residence of the cases of blackwater fever were as follows: One five months, one nine months, one eighteen months, two two years, one five years, two six years, and one ten years.

Consequently length of time of residence seems of no importance, as blackwater fever attacks the newcomers as well as the old stagers.

Symptoms.—The symptoms of blackwater fever, briefly put, are as follows: The attack commences suddenly with rigor, pain in the back, legs and loins, severe headache, nausea, retching and bilious vomiting. The skin becomes hot and dry and is rapidly tinged a yellow colour. The conjunctivæ of the eyes are coloured yellow also. The temperature rises to 103° F. or higher, and is of a remittent character during the acute stage. The spleen and liver are enlarged. But the most characteristic symptom is exhibited in the urine, which becomes dark red in colour like port wine, and sometimes black like porter. It sometimes becomes so thick and syrupy that a few drops can only be passed at a time, and it may finally become suppressed. The urine contains much albumin, the quantity depending upon the severity of the attack, and if allowed to stand for a few hours,

there is a heavy brown deposit sprinkled throughout, which is a reddish material like cayenne pepper.

I have never been able to obtain Plehn's nor Stephens' and Christopher's reaction with the urine.

There is great prostration and weakness, often followed by collapse and death.

Death in blackwater fever is generally due to collapse or suppression of urine.

Prophylaxis.—Quinine is said to be a prophylaxis against blackwater fever. It is stated that in Africa the regular quinine-takers do not develop blackwater fever. This may be a fact, but I know of two cases here who took 5 gr. of quinine bi-hydrochloride daily from the first day of arrival, and yet they developed the disease. One case unfortunately died.

Treatment.—The lines of treatment adopted by me are as follows:—

(1) Absolute rest in bed and good nursing are of prime consideration in the treatment.

(2) The patient is kept in bed warmly wrapped up and covered with blankets.

(3) His bowels are well opened by 3 gr. of calomel, followed by a saline aperient a few hours later. A bed-pan is used where possible.

(4) The diet during the acute stage consists of milk only.

Abundance of fluids are given by the mouth, such as soda-water, albumen water, tea, barley water, whey, lime-juice and plain water. Rectal saline injections are given every four hours until the urine regains its normal colour. If the attack is very acute, subcutaneous or intravenous saline injections are resorted to.

Sternberg-Hearsey's mixture with the addition of tincture of digitalis is generally given and is found most useful.

Symptomatic Treatment.—Vomiting is checked by hot applications to the region of the stomach, mustard plaster over the stomach, sip of cooled soda-water or champagne, or a very weak solution of tincture of iodine.

Headache is treated by cold compresses to the head.

Difficulty in passing water and anuria are treated by hot fomentations applied to the loins, hot packs and the administration of fluids in great abundance by the mouth, rectally, subcutaneously and intravenously as the occasion requires.

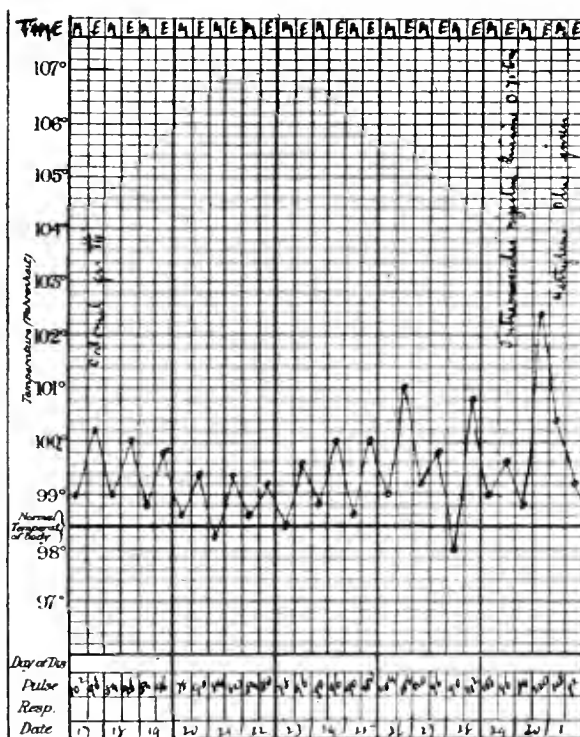
Collapse must be guarded against, and is treated by hot applications to the cardiac region, the administration of stimulants, such as brandy, hook or champagne, and the hypodermic injection of strychnine and digitalis.

Quinine.—Quinine is withheld during the acute stage, but as soon as the urine regains its normal colour, it is then administered, 5 gr. of quinine bi-hydrochloride being given three times daily.

Convalescence.—During convalescence, a tonic containing quinine, iron, arsenic and strychnine is given.

On recovery the patient is advised to go to a temperate climate to recuperate his health.

I personally have treated seven cases of blackwater fever. The above lines of treatment were adopted by me with success in six cases, but the seventh case did not respond to this treatment. In this case methylene blue was ultimately tried and proved wonderfully successful. As this case may be of interest, I herewith give details of it:—



The case in question was a Chinaman who was admitted into the Government Hospital, Tulagi, on June 17, 1920, complaining of passing reddish urine.

History of Present Complaint.—Three days previous to admission he took ill with a high temperature, sickness and vomiting. The temperature was ushered in by rigor. On the following day he became jaundiced.

He was brought in to Tulagi on the night previous to admission. On the morning of admission, on passing water, he noticed it was very dark like blood. He fainted during the act of micturition. He was then brought into hospital.

Condition on Admission.—The patient, who was well nourished, was very anemic. Jaundice was present in the skin and conjunctivæ of the eyes, but not so marked. Pulse, 102. Temperature, 99.0° F.

Soon after admission he passed about 10 oz. of very dark urine without any difficulty.

Urine.—The urine was of a dark brown colour with a specific gravity of 1025. Albumin was present, but not in great abundance. On allowing

the urine to stand, a very thick brown deposit settled at the bottom. Sprinkled throughout the whole urine was a material like cayenne pepper.

A microscopic slide was prepared from the deposit, and this slide showed the presence of bacilli, which greatly resembled the *Bacillus coli communis*.

Blood.—The blood was thin and watery and markedly anæmic. By Tallquist hæmoglobin scale it was 50.

On microscopic examination no malarial parasites were found, but there was a marked leucocytosis.

Diagnosis.—The case was diagnosed as a mild attack of blackwater fever.

Treatment.—The treatment given was the routine treatment for blackwater fever. Rectal saline injections were not given; 5 gr. of quinine bihydrochloride was administered four times daily.

Result.—There was no effect upon the temperature which remained remittent. There was a slight effect upon the jaundice. The urine showed no changes and became very offensive on standing.

On June 22 the Sternberg-Hearsey mixture and quinine were discontinued, and the patient was put upon a mixture containing quinine, arsenic, iron and strychnine.

The result of this treatment was to send up the evening temperature. The jaundice slightly increased and the urine showed no change. On June 26 urotropin, 10 gr., and quinine bihydrochloride, 5 gr., were given three times a day.

The result was that there was no effect upon the temperature, but the urine became slightly clearer and the deposit slightly less.

As the temperature still rose in the evenings, on June 29 an intramuscular injection of quinine bihydrochloride, 0.75 grm., was given. The result of this injection was that the temperature rose markedly and the jaundice increased.

On July 1 methylene blue, 4 gr., three times daily, was given. This drug had a marked effect upon the whole case. The jaundice disappeared, the temperature dropped to normal, and the urine cleared up.

On July 10 the patient was discharged.

REMARKS.

Some doubts may be cast upon the diagnosis. I myself had some doubts as to the correctness of it when the case responded neither to the routine treatment for blackwater fever nor to quinine.

It is stated that in a case of blackwater fever the urine resists decomposition for some time, but in this case it became very offensive on standing.

If this case was really a case of blackwater fever, it proved conclusively that blackwater fever is not due to malaria, as quinine had not the slightest effect upon the case.

I forwarded the particulars of this case to Dr. Breil, who was then Director of the Australian Tropical Institute, with blood smears and slides

from the urinary deposit. He, too, came to the conclusion that it was a case of blackwater fever.

Before trying methylene blue, I never read nor heard of this drug being used in the treatment of blackwater fever.

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A CASE OF MYOPATHIC MUSCULAR ATROPHY IN A NEGRO.

By J. F. CONSON.

History.—The patient, a negro, aged about 18 years, gives the following history. He is the eldest of a family of nine, all of whom are alive, and none of the others has any similar disease. His parents also are healthy. The disease began suddenly, and



FIG. 1.

was caused by a fall he had one day at an age shortly before puberty. His right arm, just above the front of the elbow, was first affected, and he lost his voice at the same time.

Present Condition.—There are wasting and weakness on voluntary movement of the following muscles of the upper extremity on both sides, viz.: trapezius,

latissimus dorsi, pectoralis major (especially the costosternal part), biceps, brachialis anticus, triceps and supinator longus. He appears unable to make voluntary movement of the serratus magnus. The movements of pronation and supination can be performed. The mobility of the scapula is abnormally increased. The thigh muscles generally are wasted and weak. In order to rise from a sitting position on the ground he first draws his feet underneath him, then places his hands on his knees, leaning well forward, and slowly rises up. His gait is waddling. The muscles



FIG. 2.

of the face are little, if at all, affected; he can close his eyes tightly and show his clenched teeth. Mastication of food and deglutition appear to be unaffected. He has aphonia, but articulates well. The condition appears to correspond with descriptions of Erb's juvenile type of myopathic muscular atrophy.

According to Spiller (1910), Eshner has stated that the negro seems to enjoy largely an immunity to muscular dystrophy.

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THE JOURNAL OF

Tropical Medicine and Hygiene

SEPTEMBER 1, 1921.

FAMINE IN CHINA.

MR. ROGERS S. GREENE, the Resident Director in China of the Rockefeller Foundation China Medical Board, Peking, China, favours us with the following comments:—

In your issue of February 15, 1921, there is an editorial entitled "Famine in China and the Chinese Flour Anomaly." In this article you call attention to the strange situation of a famine existing in China at the same time when unusually large quantities of wheat flour are being imported into the United Kingdom from China.

This situation is indeed anomalous, but perhaps less so than the casual reader might suppose. In the first place the exports of flour from China are almost exclusively from Manchuria and the Yangtze Valley, neither of which districts experienced anything approaching a famine during this past winter. This will be shown by the following statistics of exports of wheat furnished to me by the American Consul-General at Shanghai:—

	Port	Quantity in pounds	Value
Manchurian Ports	Aigun	5,409,047	\$139,510
	Sansing	1,652,653	57,766
	Manchouli	25,313,270	1,399,906
	Harbin	5,007,015	175,011
	Snifenbo	34,916,602	1,385,401
	Antung	10,950,195	483,214
	Dairen	9,312,605	398,717
	Newchwang	3,715,204	174,150
	Tientsin	162,226	7,813
	Hankow	65,999,629	2,961,255
Yangtze Ports	Wuhu	3,151,879	144,545
	Nanking	133,967	2,459
	Chinkiang	52,123,099	2,173,920
	Shanghai	785,990,387	32,810,951
	Soochow	674,898	28,146
	Canton	412,963	17,224

The total exports of flour from the whole of China for the year 1920 were 1,005,164,112 lbs., valued at \$42,378,994; and of wheat 1,557,544,517 lbs., valued at \$40,326,455.

It will be noted that Tientsin is the only port in the famine district from which any export is indicated, and that was a trifling amount of 162,226 lb.

It is well to remember that the cost of local transportation in China is very high, so that in the case of the more expensive foodstuffs it would frequently happen that they could be shipped more cheaply to Europe or America than to some inland point in China, even in the case of long distances over the railway.

Another fact which must be borne in mind before condemning China for the export of wheat, eggs, and other more costly food products in time of famine is that the country people in China are not accustomed to these expensive foods, depending more upon various kinds of millet, sorghum, maize, beans, &c. At the present time, in Peking, wheat flour is worth 12 copper cents per catty of 1½ lb., whereas millet is worth 10 copper cents per catty. As there were abundant crops of millet in Manchuria and in other provinces not affected by the famine the relief societies found it more economical to purchase millet, rather than wheat, and even the country people in the affected regions could maintain themselves longer if they sold what wheat they had and purchased millet or maize with the proceeds.

It is true that the situation which you describe testifies to the lack of mutual co-operation and the combination of common resources in time of trouble and failure to make use to the fullest extent of native resources. This, however, is no new phenomenon, and there is at least the encouragement that Chinese private contributions in money and in effort during the recent famine were far greater than foreign observers can recall in any famine in recent times.

[We need scarcely say how deeply indebted we are to Mr. Greene for the valuable information conveyed in his letter and the explanation of a state of affairs which to most Europeans was absolutely mysterious and quite impossible to understand.—EDITOR.]

MONGALLA PROVINCE.

We have been favoured by a correspondent well acquainted with the Sudan for many years. He writes as follows:—

I read with interest the leading article under the heading "Mongalla" in the JOURNAL OF TROPICAL MEDICINE AND HYGIENE, July 1, 1921, and I trust it will not be considered amiss to call attention to a few points in this article.

(1) The reader infers from the article that Mongalla Province, as now constituted, was, owing to lack of roads, an isolated district without trade intercommunications with other parts of Africa. This is not the case.

Since the Belgian occupation of the Lado Enclave, and indeed before this, a trade route existed between Rejaf (close to Mongalla) and the Belgian Congo. This route was used extensively by traders in ivory.

In the south there was also a trade route to Gondokoro and Nimule (Uganda), and from Nimule a caravan route extended direct to the East Coast.

The township, or Merkaz, of Mongalla is on the east bank of the Nile, and has been in navigable communication with stations north of it even before the British occupation of the Sudan.

It will thus be seen that free intercommunication existed between Mongalla and Uganda and the West Coast. This rather supports the theory of the possible introduction from the West Coast towns of such diseases as guinea-worm, yaws, sleeping sickness, filaria, and elephantiasis into the district of Mongalla; the method of treatment of guinea-worm, as practised by natives of Mongalla, may quite well have been introduced from the West Coast.

(2) The statement "that Mongalla with Uganda has had sleeping sickness and other West African ailments for many years before the traffic said to be due to the coming of the white man" requires verification.

(3) The reference to Mongalla being a virgin soil for sleeping sickness I must challenge. It may have been so at one time; the disease, as seen in

Yei (Mongalla District), was probably introduced, many years ago, from the Congo prior to the disease which assumed the epidemic form in Uganda.

The disease, as it exists in Yei, is of a more sub-acute or chronic type than that seen in Uganda.

(4) The statement that "nothing has been done except in a sporadic fashion to study or eliminate disease from a fertile and important district" is not correct, and is a reflection not only on the Government administration but also on the splendid work which has been carried out, under very difficult conditions, by R.A.M.C. officers in medical charge of the district. Thanks to their efforts, Mongalla, at the present day, is a very different district from that of some years ago.

From the point of view of sleeping sickness, the whole district has been controlled, and the work which has been carried out at Yei Sleeping Sickness Camp will compare more than favourably with that accomplished in other sleeping sickness areas of Africa.

Thanks to the efforts of the late Capt. Ranken, V.C (one of the pioneers of antimony treatment in trypanosomiasis), Major Thomson, Capt. Simpson, and others, sleeping sickness has been checked in the Mongalla District and a large number of cases have been cured.

Reference to the reports of the Sudan Sleeping Sickness Commission will confirm these statements.

Remarkable results have also been obtained at Yei in the treatment of yaws and guinea-worm.

Annotations

Significance of Albumin in Sputum, Application to Early Diagnosis of Pulmonary Tuberculosis (A. C. Alport, *South African Medical Report*, April, 1921).—The author has come to the conclusion that a qualitative and quantitative examination of the sputum for albumin is a useful way of arriving at a diagnosis in the early stages of pulmonary tuberculosis. The presence of albumin in the sputum indicates active disease of the lung tissue itself. Patients with 0.2 per cent. of albumin in the sputum may be regarded as suffering from active pulmonary tuberculosis.

The Intravenous Use of Foreign Protein in the Treatment of Chronic Cases of Arthritis (R. Garfield Snyder, M.D., and Maximilian A. Ramirez, M.D., *Archives of Internal Medicine*, vol. 28, No. 1, July, 1921).—Cases of chronic arthritis which were not relieved by the routine treatment consisting of sodium salicylate, acetyl-salicylic acid, colchicin, cinophen, hot packs, baking or massage, were, as a rule, materially benefited by the intravenous administration of small doses of foreign protein. The degree of benefit derived varied with the individual case, and was nearly always greatest in the joints of the upper extremities.

On the Aetiology of an Outbreak of Infectious Diarrhoea (Harry Weiss, *Archives of Internal Medicine*, vol. 28, No. 1, July, 1921).—Infectious diarrhoea and dysentery are two distinct diseases, differentiated clinically and bacteriologically. The main clinical differences are that infectious diarrhoea is a mild disease of short duration with local manifestations and no general symptoms. The symptoms are chiefly intestinal. Blood or mucus is not present in the stools. Bacillary dysentery is usually very much more severe and of longer duration, there is a marked general reaction with fever and evidence of toxæmia. The stools usually contain blood or mucus. Dysentery is defined by the author as that disease caused by *B. dysenteriae*, and infectious diarrhoea as that variety of outbreaks which are mild and are at present of unknown aetiology.

Infectious diarrhoea is probably transmitted in much the same manner that other enteric diseases are spread, one of the agencies being flies.

Of eight cases in which urine, faeces and blood were examined, seven yielded a Gram-positive micrococcus from one or more sources which were biologically identical in their reactions on fermentation medium. The organisms were agglutinated by the serum of patients from which they were obtained, and also by the serum of other patients. Three strains that did not agglutinate when first isolated were subsequently agglutinated by rabbit serum produced with a heterologous strain.

Rabbits are resistant to infection by this organism. Old and young rabbits were used, but the results were uniformly negative.

Macacus rhesus were fed with mixed strains. One monkey died on the fourteenth day after a profuse diarrhoea on the thirteenth day from which the organism was isolated. It was subsequently isolated at necropsy from the mesenteric lymph nodes and the spleen. A second monkey fed with cultures, filtered free from the broth in which they had been grown, developed a diarrhoea on the fifth day and recovered. A third monkey was fed with mixed broth cultures by means of a stomach tube. He died on the eighth day. A pathologic condition was found at the juncture of the large and small intestine and the organism was found in the mesenteric lymph nodes and spleen.

Two monkeys, one fed with the sterile filtrate from broth cultures and the other with cultures killed by heating at 60° C. for twenty minutes, developed no symptoms and remained alive.

One monkey actively immunized by a polyvalent vaccine made from these cultures was subsequently resistant to infection.

Attempts were made to immunize passively a monkey with specific rabbit serum but it died fifteen days after feeding, and the organism was isolated at necropsy from the spleen and mesenteric lymph nodes.

These experiments indicate that the organism is pathogenic for *Macacus rhesus* monkeys, produces no exotoxin or endotoxin and can be used to produce active immunity against subsequent infection.

Abstracts and Reprints.

PLEURAL SPIROCHÆTOSIS.¹

By V. R. MASON.

THE following case is reported not only as an example of a disease very rare in America, but also as the first instance of spontaneous infection of the pleural cavity by *Spirochæta bronchialis* (Castellani) which has been recorded. Inasmuch as certain assumptions, which we have been forced to make in order to explain the sequence of events in this case, are not, at the moment, susceptible of definite proof, a brief discussion of the present status of Castellani's bronchitis will be added from which a comparison of the clinical course of that disease with the symptom complex presented by our patient may be made.

Gabriel Banks, white, aged 16. Admitted to the Johns Hopkins Hospital, June 18, 1920.

The patient was born in Austria and came to America when 1 year old. He had always been a healthy boy. So far as he knows he had not been associated with any individuals who spat blood.

Present illness.—In January, 1920, he had an acute febrile illness which was believed to be influenza. He was not very ill at the time but never recovered completely. His chief complaints were cough with a good deal of expectoration and a constant dull pain under the left shoulder-blade. The sputa was often very foul. During the months following the onset of his illness he was not able to work although he was not confined to bed. On May 23, 1920, he expectorated a small amount of bloody material. The next day he visited the dispensary. Examination at that time revealed remarkably little. A radiogram of the chest showed a few small shadows in the lower lobe of each lung. No sputum was obtained. June 5, 1920, the patient had a chill followed by high fever and severe pain in the left side of the chest. He also noticed marked breathlessness. From this time until admission to the hospital the patient was very ill. He had exhausting attacks of coughing productive of a small amount of foul sputum. Each night he was delirious and had drenching sweats.

A needle was inserted into the left pleural cavity and about 60 c.c. of pinkish, milky fluid were easily withdrawn. It had a peculiar fetid odour unlike that of any empyema we had observed. It was examined without staining, and found to contain large numbers of pus cells, a few well-preserved erythrocytes, some cocci and bacilli and many actively motile spirochætes. Dark field illumination confirmed these observations. The majority of the spirochætes were two to three times the diameter of an erythrocyte in length, blunt or pointed at the ends, and actively motile. There were many rather thick coarse forms but a few were very gracile. The

number of undulations varied, but on the average four to six were present. A stained smear (methylene blue) of the fluid showed large numbers of bacilli and cocci and many poorly-stained spirochætes. No fusiform could be found.

We believe that the illness of several months' duration which preceded the admission of our patient to the hospital was produced by an infection of the lungs with spirochætes. Unfortunately these organisms were not found in the sputum, but satisfactory examinations were not made. Nevertheless the clinical course of the disease and the results of physical examination were very similar to those of broncho-spirochætosis. It is probable, therefore, that during an attack of coughing an area of pulmonary gangrene was ruptured and spirochætes were forced into the pleural cavity. Following the formation of a pneumothorax an empyema developed. The pus from the pleural space contained not only actively motile spirochætes but many bacilli and cocci. Cultures of the empyema were sterile on several occasions and it is therefore impossible to state what rôle the organisms other than spirochætes played in the production of the pleural infection. The prompt and marked improvement following the administration of salvarsan lends some support to the assumption that the spirochætes were at least partially responsible for the clinical course of the disease.

GENERAL REMARKS.

Spirochætal infections of the lungs were first described by Castellani in Ceylon in 1904. He examined two natives who had had recurring hæmoptyses for many months. There were very few physical signs from the lungs and they were not suggestive of pulmonary tuberculosis. Specimens of sputum were consequently examined unstained in order to exclude fungus or fluke infections. He found, however, in each instance numerous actively motile spirochætes. His observations were soon confirmed by Branch in the West Indies and by Waters in India. Cases of broncho-spirochætosis have been reported with increasing frequency during the last few years. Clinical descriptions of the disease or reports of cases have come from the Philippines, Switzerland, America, Africa, China, Italy, England, Servia, Belgium, Spain, Peru, Holland, Brazil, Cuba and France. It is apparent, therefore, that the disease, formerly encountered mainly in tropical or subtropical climates, has been observed in many countries located in the temperate zone.

The cases reported from France occurred chiefly during the Great War, and although many of those affected were Europeans, a large number of them had come in contact with Indo-Chinese and native African troops in whom the disease was relatively frequent. Thus in an epidemic of broncho-spirochætosis at Toulon (France) Violle observed that, about a month after the admission of Senegalese and Indo-Chinese affected with the disease, cases began to appear among troops and labourers indigenous to France, who were, however, patients in

¹ Abstracted from *Johns Hopkins Hospital Bull.*, vol. xxxi, No. 358, 1920.

the same hospital. It is probable, therefore, that the disease is largely transmitted by direct contact with patients, and this opinion is confirmed by a number of laboratory infections reported by Fantham.

The organism, *S. bronchialis*, was first described by Castellani and later more carefully by Castellani and Chalmers and Fantham. It varies from 3 to 30 microns in length and from 0.2 to 0.6 microns in breadth. The ends are blunt or sharp. There are no flagella. The number of undulations varies from two to eight; they are never so small, regular or numerous as those of *S. pallida*. The organism is actively motile. It stains well with the usual aniline dyes and especially well with Fontana's stain for spirochætes. Attempts to cultivate *S. bronchialis* have been uniformly unsuccessful.

The organism is either markedly polymorphous or else more than one type of spirochæte has been observed in the sputum of most of the reported cases. Indeed the case reported by McFie is unique in that all the organisms observed were uniform in appearance. Fantham, however, concluded from a very careful study of *S. bronchialis* and of the mouth spirochætes that the former, not normally present on the buccal cavity, is a distinct species although markedly polymorphous. He asserts that he has seen coccoid bodies, which he believes represent a resting stage of the organism from which new spirochætes are formed.

Attempts to reproduce the disease in animals have met with little success. Chalmers and O'Farrel by intratracheal injections into a monkey of heavily infected sputa succeeded in producing an acute febrile pulmonary infection of short duration and mild course. The sputa of the animal contained many spirochætes. The results of Delamare, and those of Loygue, Bonnet and Pyre, using other animals, were negative or equivocal.

The acute type of the malady generally begins with fever, malaise, headache, pain in the chest and cough. The affection at this stage is indistinguishable by physical signs, symptomatology and X-ray examination from a common acute bronchitis. Soon, however, the sputa become blood-streaked and not uncommonly frank hæmoptyses occur. The breath may have a peculiar fœtid odour, as emphasized by Nolf, and the disease may simulate very closely pulmonary grangrene. Spirochætes are usually abundant in the expectorations by the time the blood has made its appearance. After a few days, or rarely a few weeks, the cough and fever subside and the symptoms gradually disappear in the milder cases. In others, however, improvement occurs only after the institution of arsenical therapy.

The chronic type of the disease may follow an acute attack or may begin insidiously. The patient as a rule consults a physician on account of recurring bloody expectoration. Occasionally attacks of fever with some asthenia and slight secondary anæmia alternate with periods of comparative freedom from symptoms. The symptomatology, in such instances, resembles closely that observed in pul-

monary tuberculosis, lung fluke infections or certain mycotic infections, and a correct diagnosis is reached only after a careful study of the sputa has demonstrated the presence of spirochætes.

Between the acute and the chronic types many intermediate forms of the disease have been encountered. These may either clear up after several months or may go on into the chronic "pseudo-tuberculosis" type (Castellani) of the disease.

Spirochætal infection of the bronchi in a few instances has been combined with certain other pulmonary diseases. Thus Castellani found spirochætes in the expectoration of a patient with a mycotic pulmonary infection, and Branch found the same organisms in the sputum of a tuberculous patient. Recently Sinclair in the Hawaiian Islands found spirochætes usually associated with fusobacilli in the sputa of many tuberculous patients who had had hæmoptyses. His results, while of interest, have not been confirmed nor correlated with previous observation as yet.

Treatment.—The experience of most observers has proved that salvarsan or neosalvarsan in moderate doses promptly and effectively relieves symptoms and brings about a complete cure. Iodides in large doses have also been of distinct value. In many acute cases, moreover, spontaneous recovery has been noted.

Current Literature.

INDIAN MEDICAL GAZETTE. Vol. LVI, No. 5, May, 1921.

A Plea for the more frequent use of Intravenous Medication, with Special Reference to the use of Iodine (Major J. W. Porter, D.S.O. (retired)).—The author advocates a more frequent use of intravenous injections of drugs. The greatest reason for hesitating to use this method is the supposed necessity for introducing the remedy in high dilution, the complicated apparatus and freshly distilled water, apart from the fear of accidentally introducing air into a vein. Thanks to the general use of salvarsan given intravenously at the present time, hundreds of medical men are now capable and not afraid of giving intravenous injections, but it is obvious that there must be many of these who are still unaware of the possibility and advantages of giving other potent remedies in this way. It has been proved that intravenous injections of iodine in influenzal broncho-pneumonia have proved very beneficial, and it is thought that large doses (4 grs.) of iodine administered intravenously might prove valuable in cases of plague and malaria.

A modified Bassini Method for the Radical Cure of Hernia Overlapping of Externus Obliquus Abdominis (K. K. Chatterji, F.R.C.S.I.).—In order to effect a radical cure in a case of hernia it is necessary to have the following objects in view:—

(1) Thorough exploration and inspection of the inguinal canal, in order to ascertain whether a sac is adherent to any part of the canal, or to look for the presence of pro-peritoneal fat, &c. These are possible after the external oblique tendon has been divided.

(2) Isolation of the sac from its fundus, below, to a point beyond the constriction ring on the neck of the sac, above.

(3) Identification and separation of the spermatic cord from the sac. Extirpation of the sac.

(4) Obliteration of the inguinal canal without causing undue constriction on the cord.

(5) Strengthening of the abdominal parietes in such a way as to render the canal more resistant to intra-abdominal pressure.

Bassini's operation satisfies most of these objects, but the divided margins of the external oblique are simply brought together by sutures, which does not strengthen the external oblique tendon, which has been weakened with its fibres separated. In order to get over this difficulty the author devised the following plan: After suturing the internal oblique muscle with Poupart's ligament, thus closing the inguinal canal and forming a floor for the cord, the cord was allowed to repose on the floor. The external oblique was overlapped in Halstead fashion, and the fibres plicated, taking in here and there a few fibres of the internal oblique and transversalis. This strengthened the anterior wall, and at the same time did not split the fibres of the external oblique. Seventy-two cases of inguinal hernia treated in this way all gave satisfactory results, there being no recurrence in a single case.

Lead-poisoning in the Printing Presses of Calcutta (J. J. Campos, M.B.).—The writer deplores the fact that, although a great deal of attention is paid to industrial medicine in all the countries of Europe and in America, this branch of medical science is completely neglected in India. Investigations go to prove that in the printing presses of Calcutta there are and have been many cases of chronic lead-poisoning. It is true that anæmias in some cases are due to malaria from which printers commonly suffer and constipation is such a common complaint that it cannot be attributed to lead alone. But the colic, the blue line on the gums, and the changes in the red blood corpuscles in a number of cases show that lead-poisoning is far from being of rare occurrence. As the subject of occupational diseases is not only of medical and scientific interest, but has its economic, sociologic and legislative aspects, it is thought that an institute or some organization of industrial medicine is an imperative necessity in India, which is fast becoming an industrial country.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.
No. 3, March, 1921.

Note on certain Bacteria used for the Sero-diagnosis of Exanthematic Typhus (M. Béguet).—

Of four germs sent out to Africa as *Proteus* X-19 for the Weil-Felix reaction, all of which gave positive results with the serum of exanthematic typhus patients and negative results with the serum of patients suffering from other diseases, three only proved on close study to be *Proteus*. The fourth, which was the most agglutinable by the serum of exanthematic typhus patients, was an immobile, non-ciliated cocco-bacillus, producing sharply defined colonies resembling those of the coli bacillus on inclined gelose, coagulating milk slowly, giving no indol, and liquefying neither coagulated serum nor gelatine. Pending further developments, the author proposes to give the provisional name of *Coccobacillus byzantinus* to the organism.

An attempt to produce Experimental Spirochaetes in Laboratory Animals by means of Spirochaeta Berbera (Grenier).—Experiments carried out in 1914 during an epidemic of relapsing fever in eastern Morocco showed that adult rabbits may be infected by the inoculation, either intravenously or directly into the heart, of 2 c.c. of blood containing *S. Berbera*. This dose is smaller than that hitherto considered necessary. Also, contrary to general opinion, the organism may be inoculated into rabbits subcutaneously, provided the animals are young (two or three months). Subinoculations can be made from rabbit to rabbit. Mice may with difficulty be infected subcutaneously, but not by injection into healthy mucosa. Neither rats nor birds are susceptible, but the jerboa may be infected subcutaneously. The writer found that the serum from blood containing spirilla was still contagious after forty-eight hours.

A Serious Case of Clonorchiasis treated by Tartar Emetic and Curd (S. L. Brug).—*Clonorchis sinensis* eggs were found in the stools of a Chinese immigrant in Java suffering from hepatic symptoms. The liver, especially the left lobe, was enlarged, hard and painful; the spleen was swollen; there were fever, anæmia, ascites, and irregular œdema of the arms and legs. The general condition was bad, and the prognosis very serious. Tartar emetic having proved inimical to trematodes of the genus *Schistosomum*, a course of intravenous injections of this drug was given in four series spread over three months. The total quantity injected was 2.95 gm. Two months after the conclusion of the treatment no *Clonorchis* eggs could be traced in the stools, the symptoms had disappeared, and the patient seemed well on the road to complete recovery.

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Original Communications.

THE VALUE OF MUTUAL CO-OPERATION BETWEEN HUMAN AND VETERINARY MEDICINE.¹

By FREDERICK HOBDAV, C.M.G., F.R.C.V.S., F.R.S.E.

Honorary Veterinary Surgeon to His Majesty the King, and formerly Professor in the Royal Veterinary College, London.

THE subject which I wish to introduce for discussion to-day, and which I have made the title of my paper, is that of the value of mutual co-operation between the medical and veterinary professions; and I propose to ask you to consider it particularly under the heading of benefit to the general community, as this is the ultimate aim of all medical knowledge, and includes our respective individual patients and our mutual selves.

Let us first ask ourselves the question whether, by working together in the fight against disease, we are not able to get better results than if we worked in water-tight and separate compartments. To this, in my opinion, there can be but one answer, for flesh is flesh; and whether it is that of the higher animal, man, or that of one of the so-called lower creation of beasts, it is in each case liable to disease, and the object of all medical research is to discover the most satisfactory way of prevention, or, if disease is already present, of affording relief and cure.

DISEASES COMMUNICABLE FROM ANIMALS TO MAN.

Of diseases communicable from animals to man there are quite a number which equally concern the medical man and the veterinary profession, and in some of them we can claim that we take the first line of defence; and that it entirely depends upon the conduct of the veterinary hygienists, who form the vanguard, whether mankind suffers or not. I do not think that the veterinary profession in Great Britain ever asserted sufficiently the importance of its position in this respect, and I am sure the general public does not properly realize it. Think what would happen if such diseases as glanders, rabies, anthrax, and foot and mouth, to mention only a few of the most commonly known ones, were left without skilful veterinary control in the animal world.

VALUE OF THE TRAINED VETERINARIAN.

Apart from the laboratory, their only source for man is the animal or some animal product, and the only man fitted to control these diseases in animals (and to do this he must occupy the front line of trenches in the army of defence) is the veterinarian. That we occupy these trenches worthily is shown by the results attained, and it does not require much imagination to realize what might happen if no proper control was exercised.

Take the two first mentioned, glanders and rabies, as illustrations. Two of the most fatal and terrible diseases to which mankind could possibly be subjected; each transmitted to man originally only through the agency of a diseased animal, and diagnosable and preventable only by the trained and skilled veterinarian.

Truly the medical profession and the general public owe us a debt of gratitude for good work well done, and we are not vaingloriously boasting when we claim it; *it is our right and we should take it*. We are a little too modest, and recent correspondence in the press tells us that we are apt to be misunderstood in consequence. The public should remember that every disease of animals successfully stamped out means a certain financial loss to each individual veterinarian, and our medical *confères* should readily appreciate the powerful assistance unselfishly given by their veterinary colleagues in the fight against disease.

VALUE OF MUTUAL COLLABORATION IN TUBERCULOSIS AND PUBLIC HEALTH.

In matters of public health we must of necessity work side by side, and the value of mutual co-operation between human and veterinary medicine has been too often demonstrated to be ignored. In such a disease, for example, as tuberculosis the two workers are inseparable. At a recently held combined meeting of the members of the Royal Society of Medicine and the Central Board of the National Veterinary Medical Association, at which the subject selected for discussion was "The Eradication of Tuberculosis in Man and Animals," it was stated by Sir John McFadyen that in breeding animals from three years old and upwards the proportion of infected animals was not less than 30 per cent.; and that in the milking breeds it was probably nearly 40 per cent. Professor Lyle Cummins affirmed without any hesitation that bovine bacilli caused much of the abdominal tuberculosis of children, and that they were responsible for their share of tuberculous meningitis; whilst Dr. A. E. Inman tabulated 34 per cent. of children who died under the age of 5 years from tuberculosis as being caused by bovine tubercle infection, and from 5 to 10 years, 26 per cent.; 10 to 16, 12 per cent.; and 16 years and upwards, 5 per cent. These tables were made from observations collected by post-mortem and subsequent bacteriological examinations.

Dr. Halliday Sutherland, another speaker, stated that "as the bovine tubercle bacillus had been recovered in over 50 per cent. of cases where tuberculosis attacked the glands, bones and joints of children, it was probable that some ten thousand children died every year in consequence of drinking milk containing tuberculous bacilli."

These statements are sufficiently appalling to show that the subject is an urgent one, and to demonstrate clearly the necessity, in the fight against this one disease alone, if we are to obtain alleviation or even amelioration for "mutual co-operation between human and veterinary medicine."

¹ A paper read before the North of Ireland Veterinary Medical Association at Belfast.

Let the Ministry of Public Health, through its Veterinary Department, eradicate tuberculosis from its milking cattle, and 34 per cent. (a terribly high proportion) of the deaths of children who die from tuberculosis will have been dealt with. It can be done, and these deaths, at present being caused by this source, can be prevented. It is purely a question of finance and of tactful manipulation of the question of the milk supply. To slaughter 1,000,000,000 tuberculous cattle all at once, or all in one year, would be folly, but to allow 10,000 innocent helpless children a year to be infected and literally slowly poisoned is criminal when it is preventable. It seems incredible that such a matter can escape attention, and I would suggest here that we here, as an association, support the resolution which was unanimously passed on the suggestion of Sir John McFadyean at the joint meeting above alluded to, viz., "That the prevalence of tuberculosis amongst cattle in this country continues to be a serious menace to the health of human beings, and that to counteract this danger the reintroduction of the Tuberculosis Order, which was suspended in 1914, is urgently required." We should send it, with a request for urgent consideration, to the Ministry of Agriculture, to the Ministry of Public Health, and to other societies and public bodies who would be likely to have influence to support it. So much then for tuberculosis, probably *the* most urgent disease of the moment, for the eradication of which human and veterinary medicine should combine.

CERTAIN SKIN DISEASES COMMUNICABLE FROM ANIMALS TO MAN.

Now let us take comparatively minor ailments, which we in general practice come across constantly, viz., certain of the skin diseases—especially mange and ringworm.

Every veterinary practitioner, whether in town or country, at some time or other meets with cases of mange, and the fact of this being contagious from animals to man is much better known to him than to his medical *confrère*. All animals may get it, and during the late war its transmission to the men from horses, mules and camels was well verified; but in civilian life we get it constantly, and it is of no use to cure a man and to send him back to groom or be in actual contact with an infected or untreated horse—another instance where mutual co-operation between the human and the animal physician is necessary. Cure them both and both will remain cured; otherwise one's trouble becomes nullified by re-infection.

Similarly with the lady's dog, which is a much more frequent source than is generally suspected of infection to its mistress; and the cat or kitten which has been proved to pass on ringworm to children; whilst every agricultural stockman knows of the danger of handling ringworm affected eases, sources of infection which may readily be overlooked unless the fact that infection is possible is known.

My paper has intentionally been brief, but I hope I have set forth enough material to set you thinking and to interest you sufficiently to give your individual opinions on the subject of "The Value of Mutual Co-operation between Human and Veterinary Medicine."

I ask you particularly to consider the matter under the following heads:—

(1) Should we (and by that I mean both professions), by co-operating more together, be better equipped for the fight against disease?

(2) Would such co-operation be of mutual benefit to the two professions and to the general community?

(3) Would the patients of each, mankind on the one hand and the animal world on the other, gain by the co-operation?

So far as I am personally concerned, I am going to answer each question emphatically in the affirmative, and especially is it the case in the domain of preventive medicine and public health, although mutual collaboration in the domain of clinical teaching and treatment is equally beneficial and many operations are now done on human beings which were pioneered on animals. Had M. Charlier, a distinguished French veterinary surgeon, but known his cue in 1850, he was in reality the pioneer of antiseptic surgery, for his successful ovariectomies in cattle and the subsequent freedom of his patients from peritonitis were quite truly attributable to the fact that he "boiled his instruments and thoroughly washed his hands"; thus, had he but known it, by his example of surgical cleanliness, Charlier, a veterinarian, laid the foundation of modern day antiseptics in abdominal and other surgery.

THREE SCHISTOSOMES IN NATAL WHICH POSSIBLY ATTACK MAN.

By F. G. CAWSTON, M.D., Cantab.

MICROSCOPIC examination of the fresh-water snails that infest the pools where children bathe at Sydenham and Mayville shows that a heavy proportion of *Physopsis africana* are infested with the larval stage of *Schistosoma hæmatobium* and a smaller number with *S. mansoni*. Experiments at Durban have resulted in the development of *S. hæmatobium* and *S. bovis*; but examination of the urine of the boys that have bathed in these pools has revealed the presence of ova resembling those of all three parasites. The ova of *S. mansoni* is not commonly found in the urine, but occurred in both the faeces and urine of one boy who contracted the disease along with *S. hæmatobium* through bathing in the Mayville pools in 1920. The ova of *S. hæmatobium* and *S. mansoni* are both about the same size; it is uncommon to find them more than 0.16 mm. in length—they can be differentiated by the appearance of the spine, which is terminally placed in the more common variety and laterally placed in the ovum of *S. mansoni*. It is more

difficult to differentiate the ova of *S. haematobium* and *S. bovis*, as both are possessed with terminal-spined ova; but the latter variety are uniformly longer and narrower than those which we are so well acquainted with in South Africa, and which have been more carefully studied.

Infection with *S. bovis* does not cause many symptoms, and the parasites which inhabit the blood-vessels of the intestines lay their eggs in the bowel-wall, through which they escape in great numbers without causing more than chronic catarrh of the bowel. However, as the ova of *S. mansoni*, the common bowel parasite of man, occasionally escape in the urine, it is reasonable to suppose that those of *S. bovis* may also do so, and this would account for some ova resembling those of *S. bovis* which occur along with those of *S. haematobium* in a native boy who is continually bathing in the Mayville pools where oxen and mules wade and the cercariae from *P. africana* sometimes produce *S. bovis* in experimentally infected animals.

In examining the centrifugalized deposit of urine passed by this child I found very numerous ova containing active miracidia, some of which had already escaped in the undiluted urine. The majority of these spined-pointed ova were from 0.12 to 0.1575 mm. long and 0.06 mm. broad; a few were much longer and relatively narrower, and resembled those I secured from adult female *S. bovis*, being 0.20125 to 0.23625 mm. in length by 0.06 to 0.07 mm. in breadth. These are the largest I have ever obtained from the urine of a patient suffering from bilharzia disease in South Africa, and indicate infestation either with *S. bovis* or with a larger variety of *S. haematobium* than that which commonly attacks the native and European population of Natal.

In the *British Medical Journal* for 1905, ii, p. 1289 and the *Journal of Tropical Medicine*, vol. viii, 1905, p. 259, reference is made to some ova 205 microns by 53 microns which Christophers and Stephens found in the urine of a Madras native.

I found five of the long variety to 115 of the smaller oval variety in the centrifugalized deposit, both ova contained active miracidia, those which escaped from the spindle-shaped ova being the larger of the two forms. As *S. bovis* occurs in these pools, the appearance of these ova which correspond rather closely to those described in the urine by Christophers and Stephens suggests that the parasite which lays them may attack the children who bathe there. *S. bovis* was first found by Sousino in Egyptian sheep. Sanfelice and Loi describe it as occurring in Sicily, where Grassi and Rovelli found 75 per cent. of the sheep affected, and Montgomery states that it occurs in India.

The accompanying sketches were made from ova, some of which contained living miracidia and some were dead. Two of the ova of *S. haematobium* were 0.14 and 0.1225 mm. in length, one dead one was 0.11375 mm. long and two of the spindle-shaped variety were 0.2275 and 0.1925 mm. long, which was the average length of this form. It is certainly very suggestive that these eggs correspond so closely to

CAMERA LUCIDA SKETCHES SHOWING MIXED SCHISTOSOME INFESTATION FROM MAYVILLE POOLS.

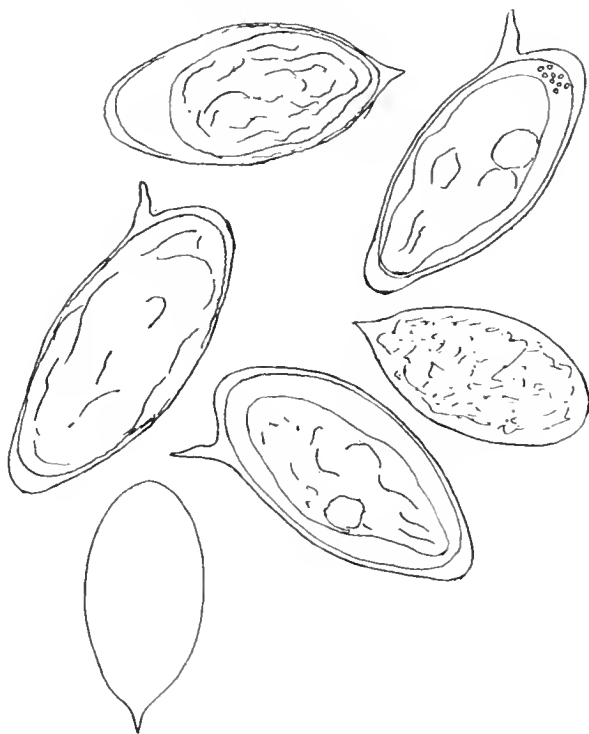


FIG. 1.—Ova of *S. haematobium* and *S. mansoni* in urine of Natal boy.

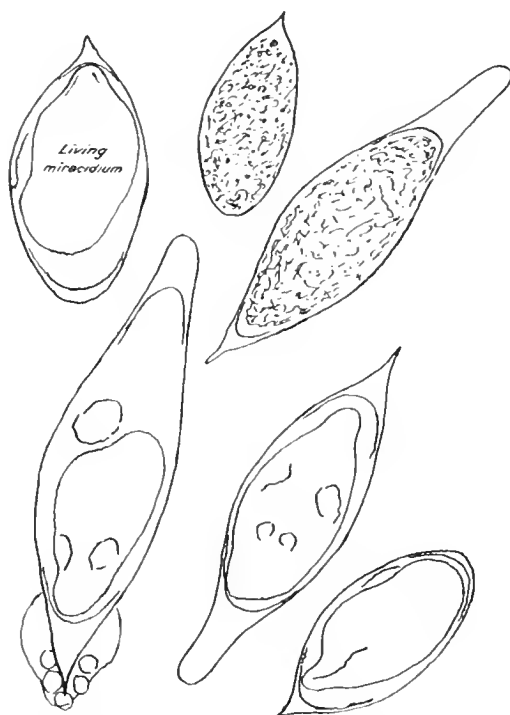


FIG. 2.—Ova of *S. haematobium* and *S. bovis*? in urine of Natal native, aged 8.

those I obtained from the adult female in guinea-pigs treated with cercariae from the same pools in 1920, and diagnosed without hesitation by Dr. R. T. Leiper as *S. bovis*. The ova of *S. mansoni* which occurred in the other boy appeared to possess slightly thicker shells than those of *S. haematobium*, but were readily recognized by their rounded extremities and their lateral spines.

INTESTINAL WORMS.

By V. S. HODSON,

Director, Khartoum Civil Hospital.

THE importance of investigating the fauna of the intestines of patients in a tropical country can hardly be over-estimated.

The following results of examination among students is of interest and value, because of the ill effects that worm infections have in handicapping growth and development.

The result of a heavy ankylostoma infection in inhibiting development has to be seen to be believed. I also record an experience with two adults who had to be operated on.

During the months January to April sixty-four boys were admitted for various causes from the Gordon College. Of these boys seven were not specially examined, but among the remainder, thirty-four were found to carry the following worm infections: 13, *Tania nana*; 7, *Ankylostomiasis*; 11, *Ascaris*; 6, *Oxyuris*; 1, *Tania saginata*; 10, *Bilharzia mansoni*.

Z. B., aged 35, was admitted with a history of abdominal pain for two months with great increase for three days. The abdomen was rigid, and there was all the appearance of general peritonitis, so I opened the abdomen, and found a large collection of pus between the intestines, which were matted together, and the pelvic organs. No cause could be located, so, as the patient was in very poor condition, I put in drainage tubes and sewed her up. After a considerable time, during which the wound discharged particularly evil-smelling pus in considerable quantity, two sections of a *T. saginata* appeared on the dressings, so male fern was given, and a large mass of *T. saginata* was passed per rectum. The wound healed in a few days, and the patient went home quite fit.

Two days before I operated on the last case I removed a fibroid uterus, and gave ol. ricini on the third morning, but without result during the day. As the patient looked well, and the abdomen was soft and flat, I waited events, and just as I was beginning to think that there must be some obstruction, an enormous mass of *T. saginata* was passed, and all was well.

The difficulty about this work is to get it done by a reliable person. I am fortunate in having Mr. Newlove as a pathological assistant, and am thus in a position to get examination done by a man who is an enthusiastic and accurate worker. In fact, all the actual microscope work referred to above was done by Mr. Newlove.

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SEPTEMBER 15, 1921.

SYS POWDER AND ITS USE IN SPRUE.

THERE are many people—aye, even in Shanghai, where the powder had its home—who profess ignorance of even the very name of this compound. Perhaps we may give a short history of this rather mystical substance which has been handled as a "quack" remedy and was administered by a quack

doctor of sorts. His name was Peter Sys, and he is said to have come from Batavia to Shanghai, China. There are several places named Batavia in the world. There is one in the State of Ohio, U.S.A.; another in the State of New York near by the City of Buffalo; a third is a place in Dutch Guiana; a fourth is the well-known seaport on the north coast of Java facing the Java Sea; and lastly, there is the Batavia River in North Queensland, Australia, in the York Peninsula, where the river pours its waters into the Gulf of Carpentaria. Of all these places the Javanese Batavia is the place most readily regarded as likely to be his birthplace, because Java is Dutch territory, yet so is Dutch Guiana for that matter. However, as Java and not Guiana is known to be one of the homes of sprue, he probably gained his knowledge of the disease there. Peter is reported to have been a schoolmaster in Batavia, but however that may be, he was for a time billiard-marker in the club at Shanghai. There he not only followed his employment in the club, but he also gained a great reputation in the cure of sprue amongst first the members of the club, and afterwards his fame reached all along the coasts of China and Japan, and Europeans flocked to him. His method of treating sprue was as follows: He first very wisely withheld all food for twelve hours; administered at the end of that period an ounce dose of castor oil. During the following twenty-four hours the patient was given a basin of chicken tea, and after that interval one teaspoonful (or two) of the "powder," which soon came to be known as Sys's Powder. By these methods he stopped the diarrhoea and allowed the patient at once to eat meat—beef-steak lightly underdone by preference.

Shortly, this is the reported trend of his treatment, and how the whole process is reported by intelligent European patients who have been treated by him. The subsequent treatment is not so exactly told, but occasional repetitions of the powder in varying quantities and the continuance of a full meat diet are certain. Doubtless many returned to their home cured of their diarrhoea, but that they were "cured of sprue" is another matter. The fact is the "treatment" seldom lasted for more than a few days, and there was not time to observe the future history of the case. Certainly all the patients of the writer who went to consult Peter ("French Peter," as he was often called), and they were several, relapsed very speedily. Why he was termed "French" Peter no one quite knew, except perhaps it was as a general name for a foreigner amongst British folk that the epithet was applied to him, and also that he could speak French, having been for some time in the French provinces of Indo-China before going north to Shanghai.

The medicine he used was declared by him to have the cuttle-fish "bone" as its basis. The bone of the cuttle-fish is described in ordinary dictionaries as the internal shell, or bone of the cuttle-fish used for making tooth powder and for polishing the softer metals, as we know the so-called "bone" is of a cartilaginous nature and is capable of being powdered finely. Having an

animal basis of structure it is liable to decompose, and long storage, and especially long exposure to sea air during a voyage through the Indian Ocean and Red Sea, was calculated to affect the material. The source of the cuttle-fish bone ingredient is the tropical seas in many parts of the world where this mollusc flourishes. The "bone" is dried and powdered to a very fine degree, and its structure lends itself to ready use as a tooth powder of commerce. Its rather glutinous nature prevents any damage to the gums and teeth, and provided it is used without a tooth-brush, which is responsible for the injury done to the gums and teeth when brushing them, the cuttle-fish powder is theoretically and practically most suitable. In regard to sprue, the material is also suitable to be taken as far as non-irritation is concerned in the bare and irritable state of the mucosa of the alimentary canal in this disease. In its finely divided state, moreover, the powder is capable of absorption of a certain amount of fluid. How far the powder serves as a mere mechanical carrier of the salts to the intestine or as an element which has a direct bearing on the contents of the alimentary canal it is impossible at present to say, but a naked-eye inspection of the stool exhibits nothing that can be assigned to the presence of the powder.

The salts which are met with in the analysis of the original Sys powder, as issued from Shanghai, are legend. Many of them are infinitesimal quantities, and as Dr. Martindale of 10, New Cavendish Street, London, says, they are in so minute quantities that they cannot have been added with any idea of their serving any important service in the medicinal properties of the "powder." Rather that they are a natural unpurified collection of salts used as obtained from the ground, as would most probably be the case, seeing that the powder was originally used by the natives of Java, who most probably used the cuttle-fish bone and a handful of an earthy salt which gained a reputation locally as a good thing for sprue, and perhaps other cases of intestinal flux. The reaction of this combination of salts in solution is alkaline, and to this fact is possibly due the chief benefit of the powder in sprue, which consists of an acid fermentation of the contents of the alimentary tract. It has long been known that bicarbonate of sodium given in sprue benefits the condition. The stools become less frothy in appearance, their odour is less objectionable, and their bulk diminishes. The alkali would seem to counteract the evils due to the acid fermentation which attends sprue. When Peter Sys died a few years ago a company was formed to continue the production of the "powder" he introduced. The writer has no means of knowing how much "Peter" told those coming after him concerning the powder. Also, not being a professed chemist he got the powder on the market, and knew nothing in reality of what he was using from a chemical point of view. The writer, however, continued to use the company's compound after they started in business.

Demands were made in various directions for information concerning the composition of this

powder, after Peter died especially. The writer was unable, however, to give the information, and at last decided to submit the powder to two friends: Dr. Martindale (see above) and to Mr. Lucas, at that time with John Bell, the well-known London chemist. The result was that two substitutes were introduced, one by Dr. Martindale, New Cavendish Street, London, under the name of Sys Substitute, the other by Messrs. Bell and Croyden, who had taken over the business of John Bell, under the name of Pulv. Batavia. These two powders the writer finds most reliable and obtains excellent results. The writer can speak from over thirty years' experience of Sys powder in its various forms, and the London products are most satisfactory; he uses these well-nigh indiscriminately; he is better acquainted with the contents of the "Sys Substitute" than with those of the other, but both are efficient. Neither are, of course, the Shanghai product, which, when obtainable, will be found to retain its properties wonderfully well; even after a long sea voyage to this country excellent results may be looked for. It is curious how little this drug is used in China itself by the doctors, judging by what sprue patients tell me, stating that they have never heard of it, although some of them come from Shanghai itself. Perhaps they have found it unreliable or useless, and, naturally, they hesitate to employ a secret remedy. It is with the object of removing this hesitancy that this article is written. To my mind there is no secrecy about it; its therapeutics require further investigation, but what drug does not? Its chemical composition requires further elucidation, naturally, from the medical man's point of view; but as regards results of administration there can be but one opinion. Scientifically, being an alkali it is correct; further, being "smooth" in its action it is commendable; that it does stay froth in the evacuations, reduce their bulk, and lessen the mucus in the fæces are facts. That it stimulates hepatic activity is doubtful, for by its exhibition the colour (biliary) is not restored to the fæces; but by arresting the frequency of the stools and allaying fermentation it allows of an increased amount of food being given, so that the liver can function and thereby increase in size, without which physiological factor being accomplished sprue will not be cured.

It is useless here to repeat what the writer has so frequently done before, viz., that he has given up milk in the treatment of sprue for over twenty-five years. A few thoughtful men have followed the example; most markedly Dr. Wood of America, as he stated in his recent visit to London. Meat-beef minced finely by being passed thrice through the mincer or pounded, to begin with, is the essence of speedy success in the cure of sprue. Sys powder in some form serves to supply the ingredients necessary to correct the faulty reactions within the alimentary canal, and perhaps confers other useful benefits. The milk treatment has had its day—a forty to fifty years' innings; its continuance owing to its inefficiency has served to give to sprue a bad name, but its use dies hard.

One recommendation milk possesses is the little trouble it gives doctor and nurse to administer—go to bed and take milk being the be-all and end-all of treatment for sprue. The meat treatment is a bother—a tax on the nurse—and the great difficulty to prepare it stands in the way of its popularity. The writer gives 5 oz. of finely minced beef for breakfast, luncheon and dinner, with a poached egg over the meat and a little Bovril over the meat to flavour it; two bananas baked in the oven until their skins are black are given at 11 a.m. and bed-time. Tea and rusk early morning and 4 p.m. A teaspoonful of castor oil (or a dessertspoonful of mist. olei ricini) every night at bed-time. Rice water and rice tea to drink and a teaspoonful of Sys powder or one of its London substitutes at 10 a.m. will be found to be the only satisfactory method of treating sprue so as to effect a cure in a few weeks. Threatenings of relapse almost certainly will occur at intervals of many months or years, possibly for thirty years after, but one day on rice water or rice tea *only* will stop its declaring itself, and a return to ordinary diet after twenty-four hours will be permissible. Gradually minced beef is left off for chops, or a cut off a joint—beef or mutton. Vegetables: potato chips or Spanish onion, or vegetable marrow is to be administered. Sprue, however, the writer does not regard as cured until any form of food is taken with impunity. Mixed diets and the gradual advance from milk to eggs, fish, chicken, milk puddings, &c., should not be attempted; it is a mere waste of time and a wholly unscientific procedure.

JAMES CANTLIE.

Abstracts and Reprints.

MOUNTAIN SICKNESS IN THE ANDES.¹

By Surgeon Lieutenant-Commander F. E. FITZMAURICE, R.N.

THOUGH I have only seen a few cases of this particular disease, known as *puno* in Bolivia and as *soroche* in Peru, I am forwarding some notes I made on the effect of high altitude on those who are not accustomed to it. I did not accompany the first party, but made notes on their return to sea-level; I had, however, the pleasure of being with the second party on their trip to Bolivia.

The first party, consisting of eight men, left Lima, in Peru, at 6 a.m. on Monday, January 5, 1920. They travelled on the Central Railway of Peru, and did not make any break in the journey until they arrived about 6 p.m. at their highest point—namely, Tielio, nearly 16,000 ft., twelve hours from the time they left sea-level. Going up, three of them noticed slight deafness at about 7,000 ft., and, from that on, all noticed difficulty in breathing and extreme shortness of breath on the

¹ Abstracted from the *Journal of the Royal Naval Medical Service*, vol. vi, No. 4, October, 1920.

slightest exertion, which increased with the height. When they arrived at Tielio (16,000 ft.) four of them suffered from severe occipital headache, and one described the sensation as if a band were being tightened about his head. Nearly all felt very tired and had no appetite; three suffered from nausea but did not vomit, and few slept well. From Tielio they went down to Oroya, a little over 12,000 ft. high, where they arrived next morning, Tuesday, January 6, and intended shooting on Lake Junin. All suffered from lassitude, more or less severe headache, and extreme shortness of breath, several halts being necessary when walking to the boat less than a mile away; two suffered from nausea and syncope and one from vomiting; the pulse and respirations were practically normal when at rest, but increased in frequency on any exertion, however mild. Though all keen sportsmen, four felt so ill and had such severe headache after their few hours' duck shooting from the boat in the morning, that they were forced to spend the afternoon resting on their coach. Several of the others told me that, though they shot that afternoon, each was silently praying that someone else would fire first at any bird they saw and save him that painful operation. The next day, Wednesday, January 7, the second day at 13,000 ft., everyone felt slightly better, headache and shortness of breath being the chief trouble. They left Oroya next morning at 8 o'clock, arriving at sea-level about 9 o'clock that evening, feeling very tired, and, as some expressed it, as if they had been sick for a month. When they got down to about 7,000 ft. all felt a marked relief, two having noticed slight deafness, which soon passed off. Four suffered from very marked conjunctivitis for several days after arriving at sea-level; another from an eczematous eruption of the lips.

The second party, consisting of five others and myself, three having been on the previous trip, left Mollendo, in the south of Peru, at noon on Monday, January 12. We arrived at Arequipa (7,500 ft.) about 6 p.m. the same day, where we spent the night. Some noticed slight deafness, which was partially relieved on swallowing, as if there was some obstruction of the Eustachian tube; this and breathlessness were all that was noticed. The next day, Tuesday, 13th, we reached our highest point, Crucero Alto, about 15,000 ft. above sea-level. During the whole there was only one member of the party who was really ill. He suffered from very severe headache when we reached 13,000 ft., which was continuous during the whole journey, and it was so severe at times that he could not remain in his bunk, but had to get up and walk up and down. He had an attack of vomiting when we got a little higher, was unable to eat, and felt very ill. He vomited on several occasions, but felt slightly better that night when we got down to Juliaca at 12,000 ft.; his pulse and respirations were only slightly above normal, his temperature being 99° F. on one occasion. The next day he had another attack of vomiting when we got up to 14,000 ft. on the line to Cuzco, but felt sufficiently well when

we arrived at that place about 3 p.m. to visit the pre-Inca ruins, Cuzco being only 11,000 ft. From the third day he felt generally better except from headache, from which he seldom was free, and which varied in intensity from time to time. It is interesting to note that from the third day we did not go any higher than 13,000 ft.; 10 gr. of aspirin, however, gave him considerable relief on most occasions and enabled him to get to sleep. He usually woke about 4 a.m., and had to take another 10 gr. before he could get to sleep again. Near Puno at 12,000 ft. he had a very slight attack of epistaxis. During our two days at La Paz he still suffered from severe headache, though we had been at 12,000 ft. for five days at that time. He did not feel well until we got down to 7,000 ft. again, when the change was extraordinary. Within two hours he felt absolutely well, ate a good breakfast, talked and laughed, and was quite fit when we reached Arica at noon on Monday, January 19, having left La Paz, 12,000 ft. above sea-level, at 8 o'clock the previous evening. Of the other members of the party, one vomited when we landed at Guaqui, in Bolivia, for no apparent reason, but did not feel ill. We had spent the night on the steamer crossing Lake Titicaca, but it was absolutely calm, and he does not suffer from sea-sickness. Another member used to wake at different times of the night to find himself suffering from dyspnoea, which he said was the cause of his waking, and he had to sit up in his bunk and breathe deeply for several minutes before he could resume the recumbent position. I know, often during the daytime, even when at rest, I experienced a sensation as if my chest was being compressed and I was suffocating, and this resulted in my automatically taking a few deep inspirations, each ending in a few quick interrupted sobs, as if one was about to cry; this sensation would last for about thirty seconds or so and then pass off. Five of us played tennis at La Paz at 12,000 ft. with no ill-effects, except that after running a few yards one felt as if it had been as many miles. I noticed that of our party several indulged in many deep inspirations during the game, whereas those who had lived at that height for some time, though they were short of breath, did not "gasp," as it were.

SOME NOTES ON THE PECULIARITIES OF THE DISEASE.

From what I can gather from the numerous people I have spoken to on the subject of puno or soroche, some being medical men, there is only one conclusion to come to—namely, that little is known of the actual cause of the disease beyond that it occurs at high levels. None appear to know why, for instance, some should suffer while others escape, why it is worse in some places than in others (these places are known as "puno valleys"), why, again, some may not suffer from the attack on their first ascent, but do so on their second, and so on. It is impossible, as far as I can see, to say to any individual, no matter at what age, sex or build, "You will not get an attack of puno."

EFFECT OF RAPID ASCENT.

This is the one point which appears to be fairly well established and on which all agree—namely, the slower the ascent the less likely is the individual to succumb to the disease. This is probably why only one member of the party I was with was seriously affected, as we spent the first night at Arequipa at 7,500 ft., whereas of the first party who made a non-stop ascent, nearly all had headaches, and three were seriously ill. When a newcomer takes on work at the mines, at 15,000 ft. or 16,000 ft., he spends the first night at an elevation of 10,000 ft., and does not do any work for the first week at the mines.

SEX OR AGE.

As a rule females are supposed to suffer less than males; this may be partly explained by the fact that they do not lead such a strenuous life, and are usually more abstemious in their habits than males. Children under 12 or 14 years of age are less liable to an attack.

ALCOHOL AND TOBACCO.

If a person indulges in alcohol on the journey he is more likely to suffer from *puno*, and the symptoms will probably be more severe. Habitual alcoholics, provided they are moderately abstemious during the ascent and do not drink in excess while at the higher altitude, do not appear to be any more susceptible than the total abstainer. If a person who is a heavy drinker suffers from an attack, it is usually a very serious one. Tobacco for those who are in the habit of smoking does not appear to have much effect either way. Our party, except the one person who was ill, and, by the way, is a light smoker, smoked both pipe and cigarette the whole time with no ill result. Personally, I noticed that more matches were required to keep one's pipe alight.

ACCLIMATIZATION.

It is evident that the Indians who are born on the plateau of Lake Titicaca, between 13,000 ft. and 14,000 ft. above sea-level, and who live there all their lives do get acclimatized, and do not notice to any great extent the extra one or two thousand feet to the mines, where incidentally they do most of the manual labour. They do suffer from shortness of breath when working at that height, but to a less extent than a person who has lived at a lower altitude. It is hard to say if people who have lived part of their lives in the lowlands and then start work at these higher levels ever do get acclimatized to the condition. For example, one person I met at La Paz, an Englishman, aged about 35 years, who leads a healthy life and is in excellent health, worked at the mines in 1908 for nearly a year at 17,000 ft. and never suffered the slightest inconvenience. He came down to the lowlands for two years, and went back to the mines again in 1911. On his return he was in the best of health, kept quiet, and retired to bed early. Next morning he was feeling ill with the usual symptoms of *puno*—

headache, shortness of breath and slight vomiting, later in the evening air hunger became very distressing; this continued during the night with spasms of coughing and vomiting. He was given inhalations of oxygen and injections of strychnine and digitalis without much relief. Luckily the next morning there was a train going down to Antofagasta, on which he took passage. When he got down to 10,000 ft. he was considerably better, and at 7,000 ft. was nearly well. The doctor told him afterwards that but for there happening to be a train going down that morning his recovery would have been doubtful. This case is interesting in that it occurred in an absolutely healthy individual who had been at 17,000 ft. two years previous to the attack for nearly twelve months, and has spent several years at these elevations since then, being in excellent health all the time with this one exception. Another peculiar case I knew of was a servant girl who was born at 12,000 ft. and had lived there all her life. She is about 20 years of age, and came down to sea-level with her employer for six months. The family returned to the hills by the same train as the party who went to Oroya, and she returned with them. When they got to 12,000 ft. she was extremely ill with all the acute symptoms of *puno*, though she had lived at this level all her life, except for the six months at sea-level. From numerous other cases I have heard of, it is impossible to say, because a person suffers from *puno* on his first trip to the hills that he will do so on his second or subsequent trips; nor that there is any special type of individual who is more susceptible than another; fat, plethoric individuals seem to be as immune as the thin, lean type. Certain people, however, seem to enjoy natural immunity for no apparent cause, whether short and stout, tall and thin or of perfect development. In certain localities the disease appears to be more prevalent than in others; for instance, La Paz, which is a town over 12,000 ft. above sea-level in a valley completely surrounded by hills. Also they say it is worse where the metals abound such as near the mines, whether of tin, copper, or silver. All the people I have met who have lived at this high altitude for some years told me they have lost their former energy, and are now easily fatigued even after slight exertion. On arrival at sea-level, even to those who have lived most of their lives at high altitudes, very few effects seem to develop beyond perhaps slight headache and deafness for a day or so. I have not heard of any serious symptoms beyond these. Why this should be the case, when such symptoms, sufficiently serious to cause death on several occasions, have occurred in those who have made even rapid descents from this height, is at least peculiar.

TREATMENT.

For mild cases, rest in bed with the window wide open is all that is required; the patient should remain quiet for a day after all symptoms have disappeared, avoid heavy meals, and see that his

bowels are regular. Aspirin, in 5 or 10 gr. for a dose, is of great use in relieving the severe headaches. Severe cases developing cardiac or nervous symptoms should be sent down to sea-level as soon as possible. It is peculiar that, though the lack of oxygen at those heights must play an important part in causing these symptoms, still if it is given by inhalation to these cases it affords practically no relief. The Indians have several herbs they chew and make an infusion from, in which they have great faith. Near Logunillas, at 14,500 ft., I got two of these herbs from a party of four Indians who dug them up by the railway line prior to going higher up the mountain shooting vicuña. They called them "*chacha como*" and "*flor de puna*." They resembled a very small parsnip, but what they are I do not know. None of our party had sufficient courage to try their healing properties, and I did not meet any other person who had done so.

SOME DEFICIENCY DISEASES AND LEPROSY.¹

By A. STAYT DUTTON, L.R.C.P.Lond., M.R.C.S.Eng.

LEPROSY.

THIS disease is prevalent in many parts of the world, and has been so for an unknown and incalculable period of time. There are considered to be records of its prevalence in Egypt and the East for thousands of years. England has experienced its ravages on many occasions, although it has not been seen in this country for over a hundred years. Sir Jonathan Hutchinson made considerable effort to ascertain the cause of leprosy, and travelled a good deal in different countries for this purpose. He appears to have been convinced that the food supply has considerable effect in its appearance, and notes that it never developed in the United States, with the exception of parts of California, attributing this to the circumstance that it is almost the only country where colonization took place without an initial stage of considerable hardships, and that a good variety in foods was practically always available. In holding this opinion I do not think the judgment of Hutchinson is likely to have been at fault.

The study of the affection from an ætiological point of view presents a number of especially interesting features. It is considered to be due to the *Bacillus lepræ*, discovered by Hansen in 1871. It is remarkable how closely the nervous symptoms of beriberi resemble those of lepra anæsthetica. The numbness, anæsthesia, loss of power in the legs, arms and hands are very similar, as well as other symptoms, and may in both diseases result in muscular atrophy, with foot-drop and wrist-drop. Each is also particularly prevalent in the Far East. Lepra anæsthetica can occur without association

with lepra tuberculosa, and be present for a considerable time before the latter may eventually make its appearance; but Hutchinson says the tuberculous variety never occurs before the anæsthetic kind is in evidence. This appears to support the food theory.

I do not suggest that leprosy is caused by the taking in of bacilli in fish, but there seems to be the likelihood that when the food supply mainly consists of it a deficiency in dietary occurs. Fridenwald and Ruhrah say salting modifies the flavour of fish. According to Liebig, one-third of the nutritive value of meat is lost by extraction during the process, and it may then be reasonably expected to have some such unfavourable effect on fish. Leprosy is common in Iceland and on the west coast of Norway, and Hutchinson says it more generally prevails on the sea coast, or near lakes and rivers, where fish is largely or mainly consumed. On looking into the composition of fish, it is seen that none of them contain carbohydrates with the exception of shellfish. The obtaining of a sufficiently liberal supply of the last-named fish would not be possible in some districts, but even if it were the amount of carbohydrates they contain might not be sufficient to maintain the proper balance in constituents. It seems to be the case that a diet chiefly composed of fish is unsuitable, perhaps especially so when salted, and it is likely that leprosy may eventually be recognized as partly a deficiency disease, sometimes owing to the predisposition caused by a diet mainly of fish, and at times to another dietary which is deficient in various necessary elements.

That leprosy is contagious has been a matter of belief for centuries, people having been accustomed to avoid the society of lepers and to banish them to out-of-the-way places; but although this is so, the theory of contagion is not generally accepted. Sanitation has advanced with rapid strides in different countries in comparatively recent years, but is well known to have been highly imperfect in ancient times, and even now is still little in evidence among some nations in comparison with that which is the case in Britain and elsewhere. That the attendants at the Hendela Leper Asylum in Ceylon do not contract it, is said to be unfavourable to contagion theories. On the other hand, Father Damien de Vensta, who left Belgium to go to a leper asylum in the Sandwich Islands in 1873, was observed to be suffering from leprosy in 1882, and died from it in 1889. Precautions as to person and clothing are usually some of the first things in which nurses and hospital attendants are instructed; but a priest, being comparatively unversed in medical affairs, might tend to neglect them to a certain extent, while attendants are not likely to do so. He may also have been less inclined to be careful in dietary and environmental conditions, while the nature of his calling may have contributed to possible infection. That this seems to have been the case can be gathered from Edward Clifford's "*Father Damien*," in which is described

¹ Abstracted from the *Proceedings of the Royal Society of Medicine*, vol. xiii, No. 6, April, 1920.

how the latter often lived in a polluted atmosphere, washed the bodies, dressed the sores, visited the deathbeds of those who were suffering, and even digged their graves. His case appears to favour contagion.

Tubercle bacilli show a considerable resemblance to those of leprosy, but exactly by what agencies the tubercle bacilli enter the body is in all cases, of course, not wholly determined, as, for instance, in regard to the effect of a spray of secretion from the mouth of another, and of tuberculous meat. It may be, and it is I think likely, that the bacilli of leprosy also enter the system in various ways. That the reason of the occurrence, apart from bacilli and mode of infection, differs in the main in the two diseases is evident, as tubercle is still prevalent in all countries, while leprosy is not. Leprosy is not considered to be hereditary, but is said to resemble tuberculosis in a possible predisposition. The bacilli have not been found in earth, dust, water, food or air. They increase greatly and are highly infective, and it is stated that few diseases show equal infection. The bacilli leave the body by the nasal, salivary, lachrymal, mammary, seminal or pulmonary secretions, and the urinary and intestinal excretions.

Owing to the overcrowding, inefficient housing and other unfavourable environment in Eastern countries and elsewhere, the opportunities of contagion appear to be manifest, especially in districts far removed from modern methods. Sanitation and hygiene are quite ineffective in different parts where leprosy is prevalent, in the abodes which are largely one-storey wooden or mud erections, often pervious to rain and dust, all around them and in the streets; while public places, as inns, are also said to be particularly uncleanly and insanitary. Ablutions of person and clothing are often almost unknown; lepers sit about in doorways or in the streets, and are stated to believe that if they can communicate the disease to another their own affliction will be lessened or relieved.

Latrines and urinals may not be cleanly or satisfactory in position or may be used in common by many in out-of-door places, and the bacilli may enter the body of a person predisposed to infection by the urethral or rectum orifices. The bacilli may be communicated from one person to another by the use of the same towel, handkerchiefs, or any material used for similar purposes; also by the nasal, pulmonary or seminal secretions, and possibly by contact with those wearing sweat and skin-scale impregnated garments. Clothing of the feet and legs may be non-existent or imperfect, so that cuts and abrasions of the lower extremities would be likely to afford a ready entry for bacilli from excretions under generally insanitary conditions. Father Damien was scalded on the foot when he was known to have anaesthetic leprosy, and later was told that he had more serious complications. The natives of Ceylon have attributed the onset to the bite of a rat, and such wounds may admit infection. Women are said to be less prone to the disease than men, and this may possibly be attri-

butable to their having more regard for sanitary methods in certain respects. The question of the entry of bacilli through the medium of blood-sucking insects has been investigated to a considerable extent with negative results for the most part. If this were the usual mode of infection, it is probable that the matter would have been already determined on the basis of knowledge now forthcoming in regard to other insect-borne diseases. But it may be possible that insects on occasions transfer bacilli on their exteriors from persons affected, or excreta to another having wounds or abrasions of the skin. There appear to be a number of ways coming under the head of contagion in which the bacilli may gain access to the system.

Hutchinson was of opinion for a time, after the discovery of the bacillus of leprosy, that the matter of causation required no further investigation, but later became aware that this was not the case. His death occurred in 1913, when the knowledge of deficiency diseases was not so far advanced as is at present the case, but owing to his efforts and those of numbers of other investigators, it now seems possible to arrive at conclusions more likely to be acceptable, namely, that leprosy is largely predisposed to by ineffective feeding, also by defective personal hygiene, sanitation, housing, and general hygienic environment; the bacilli gain access to the body in manners such as described, with the possible subsequent addition of the whole chain of tuberculous manifestations and disabilities.

The question of prevention seems to resolve itself into the need of conforming to customs and habits found efficient in England and elsewhere, particularly in regard to food, and other effective predisposing agencies, with, in addition, the isolation of those infected with the *B. lepræ*. Needless to say, prevention is far from being a purely medical question, as matters relating to a number of other affairs are involved, and while housing and sanitation require attention in this country, the need of such is almost incomparable in degree with that in different oversea, eastern and other lands. With effectual organization, determination, will-power, man-power, and other necessary factors set actively in motion, it is in my belief possible that matters could shortly be greatly improved, and with output of sufficient energy, in a decade or two the devastating disease become almost, if not entirely, eradicated from countries where it is now prevalent, and relegated to the position of a disease of the past, as has been the case in this country and in others.

ON DIETARY.

Although I am not acquainted with the habits in regard to diet of all kinds of birds and beasts, from observation of those in England there seem to be none in their free state that confine themselves mainly to one kind of food. The early bird, after catching and disposing of the worm, continues throughout most of the day to seek for and obtain a good variety of different cereals, or other vegetable or animal matter, which quickly disappears

into its crop; the domestic fowl will also actively pursue a similar course if it gets its own way sufficiently; while a farmer has too much common sense, both from the needs of the case and consideration of his pocket, to attempt to prepare well-fed beasts for the meat market, by sustaining them on any but a good, wholesome and varied diet. The instincts of dumb creatures thus appear to afford indications to man in respect of feeding and the maintenance of health.

It seems to be evident that mankind partakes of foods both for enjoyment and sustenance, and one can hardly imagine practically any member of the white races in either social class anticipating with particular pleasure the ingestion of three meals a day consisting chiefly of rice, fish, or any one kind of foodstuff, from one year's end to another; or expecting to rise from the table after such meals with the sense of satisfaction they are accustomed to experience after meals consisting of a suitable and properly moderated variety of foods. Milk is generally considered the most perfect in its chemical composition, but requires to be supplemented at an early age by other foods if nutrition is to be continued according to the requirements of modern highly civilized races. Large numbers of persons in far eastern overseas countries and elsewhere do not conform to the customs of modernized nations in regard to dietary. What the reason of this may be is not my purpose to attempt to discuss closely, but possibly it is largely owing to centuries-long habits and customs which tend to cling and are not easily cast off. It may also be that the failure fully to appreciate the value of advance in other nations, or unwillingness to bend the back sufficiently in honest toil, and cause the brow to sweat in turning over the soil, has something to do with it. The moral of these diseases, as far as food supply is concerned, appears to be that a mixed diet of fresh and wholesome foods is best, and that if such is not available, no matter what the cause of the defect may be, troubles in regard to health are liable to make their appearance. No one can deviate from the principles of health with safety, this being brought under the notice of most practitioners daily and often more than once in the twenty-four hours.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE. No. 3, March, 1921.

The Public Medical Service in French India, and the Pondicherry Medical School (Dr. Guérin).—The French medical organization in India, dealing with a population of 350,000, comprises four hospitals, fifteen dispensaries where advice and medicines are given gratis, twelve travelling "vaccinators," a leper house, and two asylums for the aged. The institutions are staffed by graduates from the Pondicherry Medical School, which, having been originally established in a primitive form in

1823 for the training of native students, is the oldest of the French colonial medical schools. Besides offering a five years' course on thoroughly modern lines to French, foreign and native students of medicine, and a three years' course to women in midwifery, the school trains a number of high caste natives as "vaccinators" for Government work among the outlying villages. The assistance rendered by the "vaccinators" is of the most valuable order; they make house to house visits among the scattered portions of the population, where Europeans find no access, and vaccinate the children wherever persuasion can overcome the superstition of the parents. Largely as the results of their efforts, the number of deaths from small-pox dropped to 575 in 1919 from 1,800 in 1916.

Contribution to the Study of Insects propagating the Flagellosis of the Euphorbia (A Laveran and G. Franchini).—Latex-sucking insects, taken during the summer and autumn of last year from infected euphorbia in the neighbourhood of Bologna in Italy, included (1) *Lygidae*: *Nysius* sp.? and *Lygus* sp.?; (2) *Cimicidae*: *Calocoris chenopodii* and *Megalocera ruficornis*, but no *Stenocephalus agilis*, the insect incriminated by França as not only transmitting the disease from euphorbia in Portugal, but also as being the primary animal host of the infecting flagellate. As *Nysius* has been found on infected euphorbia in Mauritius by Lafont and in India by Patton and Cragg, and as flagellates were found in the digestive tubes of some of the specimens of *Nysius* caught at Bologna, it is suggested that this species may be capable of acting as host to *Herpetomonas davidii* during one stage of its existence, and may in some localities be the primary animal host of the parasite.

Intestinal Parasitism in the Marseilles District (E. Pringault).—Recognizing the importance of the rôle played by intestinal parasites in certain infectious diseases, the author considers that an index should be established for each division of France showing the degree to which such infestation is prevalent. Studying the question in the Marseilles district, and deriving his data from the patients under treatment in the hospitals and asylums, he calculates the average percentage for protozoa as 25.66 and for helminths as 38.85, the former occurring much more commonly in adults than in children, while for the latter the reverse is the case. The protozoa observed were, in order of frequency, as follows: *Amoeba coli* (9.01 per cent.), *Amoeba dysenteriae* (4.66 per cent.), *Lambliia intestinalis* (2.96 per cent.), *Trichomonas intestinalis* (0.6 per cent.—children), *Le Dantec's spirillum* (five cases). The worms were: *Oxyurus vermicularis* (11.87 per cent.), *Trichocephalus trichiurus* (8.16 per cent.), *Ascaris lumbricoides* (8.15 per cent.), *Tenia saginata* (2.54 per cent.), *Bothriocephalus latus* (0.21 per cent.), *Tenia solium* (0.10 per cent.). The cause for most of the infestation, especially as regards the children, would appear to lie not in the drinking water but in the drainage system of Marseilles, where refuse of all kinds finds its way to the gutters.

The Presence of Eggs of Unidentified Nematodes in Faecal Material examined in Guiana (Marcel Leger).—In the course of research work entailing the study of 3,000 stools the writer noticed three species of nematode eggs unlike any of those usually seen in human faeces. The first type, observed in four patients, resembled *Ascaris lumbricoides* eggs except for their large size; they measured from 100 to 110 microns by from 70 to 40 microns, and might possibly have been the eggs of *Ascaris mega-locephala* of the horse. The second type, seen in two patients, was very like *Necator americanus*, but larger—from 82 to 90 microns by from 80 to 42 microns; it seemed most nearly comparable to *Trichostrongylus vitrinus*, but neither *Trichostrongylus instabilis*, *Harmonchus* (*Strongylus*) *contortus* of sheep, goats and cattle, *Strongylus armatus* of the horse, or *Strongylus orinus* of sheep and goats could be excluded. The third type was seen in one patient only—a native—and resembled no species so far described by any writer. The eggs measured 125 to 130 microns by from 70 to 80 microns, were ovoid in shape, broader at one end than the other, light in colour, with a thin membrane and a very finely granular vitellus slightly retracted inside; there was no operculum. No adult worm could be obtained in any of the three cases.

Concerning Necator Americanus Stiles 1902 (Marcel Leger).—Leger wishes to record the fact that Stiles' differentiation between *Ankylostomum duodenale* and *Necator americanus* was anticipated by a French naval officer, Dr. Maréchal, in a note published in 1868 which never came into general view. Maréchal described in detail the same differences between the two species which Stiles established later, viz., the constitution of the buccal armature, the formation of the caudal bursa in the male and the position of the vulva in the female. That this note should be withdrawn from obscurity, Leger concludes, after quoting Maréchal's description *in extenso*, enables a just tribute to be paid to a modest scientist whose work was carried out under difficulties, and in no way detracts from the merit of Stiles' research.

Capture of Theobaldia Spathipalpis Rondani in the Bouches du Rhône (E. Pringault).—The species, hitherto considered rare in France, was found in numerous ponds, ditches, &c., near Marseilles during the months of August and September, 1920. A very large quantity of larvae was observed in one particular pond where butterfly and May-fly larvae abounded, but from which *Culex* larvae were absent; ducks and geese came to bathe in the water several times a day. Material obtained from all the pools examined and found to contain *Theobaldia* gave either *T. annulata* or *T. spathipalpis* on cultivation. The two species were never found together in one pool, although the conditions favourable to both are identical.

Insects injurious to the Medicinal Plants of the Crimea (L. Parfentjev).—Owing to the difficulty of importing drugs from abroad the cultivation of

medicinal plants has largely developed in Russia since the first years of the war, and side by side with research on the growth and use of the plants a study of insects injurious to them has been made. *Atropa belladonna* L. suffers most in this direction, being attacked by several species of Coleoptera and by the larvae of *Manestra brassicae* L. and *Heliotis peltigera* Schiff. *Ricinus communis* L., which is very successfully cultivated, suffers little from insect attacks. *Papaver somniferum* L. is ravaged by *Ceuthorrhynchus macula-alba* Herbst. Both *Althea officinalis* L. and *Althea rosea* Cav. are the prey of *Podagrica malva* Illig., while the latter also falls a victim to *Baris nitens* Fbr., *Apion longirostre* Ol. and *Apion validum* Germ., and the former to *Oxythyrea funesta* Poda. The flowers of *Feniculum officinale* Allione attract various Hymenoptera, Diptera and Coleoptera, and *Graphosoma lineatum* L. sucks its fruit. The leaves of *Melissa officinalis* L., cultivated in the Crimea both for its medicinal properties and for the bees, are perforated by several species of *Chrysomelidae*.

The Fight against Epidemics among the Crimean Refugees at Constantinople in December, 1920.—The measures taken by the Inter-allied Health Conference at Constantinople to deal with the arrival of the remnants of Wrangel's army from Sebastopol were wonderfully successful in view of the extreme difficulty of the situation. Constantinople was already overcrowded when suddenly called upon to receive 150,000 soldiers and civilian refugees, so crowded on the few boats available that many of them had been unable to sit down throughout the voyage. People suffering from contagious diseases were huddled together with the healthy and with wounded men whose injuries had not been dressed for ten or twelve days; all food, water and medical stores had been consumed long before the vessels reached port, and all those on board were in an unimaginable state of filth. Exanthematic typhus, typhus recurrens, small-pox, cholera, typhoid and plague broke out within the first few days after arrival, and the most rigorous prophylactic measures had to be instituted. As regards exanthematic typhus, the epidemics which had ravaged southern Russia during the two previous winters would seem to have weakened the virus, for though all the refugees were covered with lice the number of cases was less than expected. Typhus recurrens, on the other hand, assumed epidemic proportions; the mortality, however, did not exceed 3·5 per cent., and there were few cases of icterus. Asiatic cholera was stamped out by vaccinating the whole camp; eighty-four cases were declared in the first week, out of which forty-five died. Plague occurred among the passengers on one of the boats, but quarantine measures and destruction of rats prevented it from spreading. Cases of small-pox, typhoid fever, and erysipelas were sufficiently numerous to cause great anxiety to the authorities for some little time after the landing, but the outbreaks were quickly got under control.

Original Communications.

A CASE OF FEVER RESEMBLING DENGUE
OCCURRING AT ACCRA, GOLD COAST.
NOTES OF SOME OTHER SIMILAR CASES.

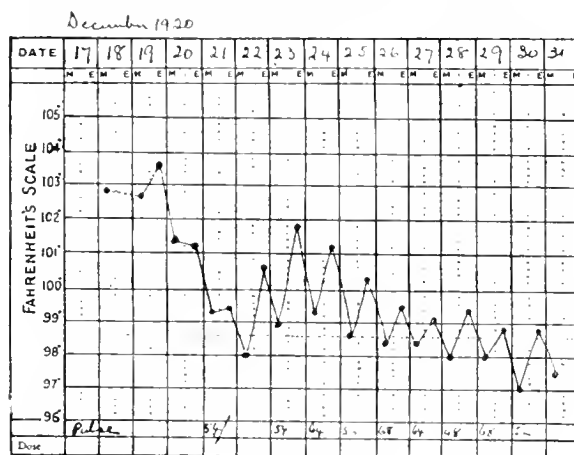
By J. F. CONSON.

THE following case is of interest as an addition to the several cases of dengue-like fevers in West Africa that have been recorded from time to time.

W. L. B., male, European, aged 26 years, landed at Accra on October 7, 1920. He had not previously been in the tropics, had not suffered from malaria, had had measles, but not scarlet fever. His health had been good since his arrival, and he had taken 5 gr. of quinine daily. On December 6 he went to Nsawam, about twenty-five miles inland from Accra, and returned to Accra on December 15. On December 17 he felt pains in the back and limbs, and took 10 gr. of quinine in the evening. On December 18 I saw him about 11 a.m. His face was flushed, but there was no injection of the conjunctivæ. His temperature was 102.8° F. A rash was noticed on the chest and arms, but its distribution and character were not especially observed at the time. He had taken 5 gr. of quinine that morning, and later in the day took 20 gr. His chief symptoms were aching pains in the back and limbs, especially the back, and he had a slight headache. On December 19 I did not see him, but he noted his temperature, 102.8° F. in the morning and 103.6° F. in the evening, and took 24 gr. of quinine and 5 gr. of phenacetin. Next morning, when visited, he had taken 8 gr. of quinine; a blood film taken on the morning of the 18th showed no malarial parasites, and from now onwards he took 5 gr. of quinine daily. There was a general eruption of very small macules and bright red points, especially closely set on the front of the chest and abdomen, and presenting an appearance intermediate between measles and scarlet fever, but more closely resembling the latter than the former. On the palms of the hands the rash showed as discrete red macules about $\frac{1}{16}$ to $\frac{1}{8}$ of an in. in width. The tongue had a moist creamy coat on the dorsal surface, while the tip and edges were clean. The posterior wall of the pharynx showed three bright red congested patches, but he had no symptoms of sore throat. The lymph glands in the axilla and at the back of the neck, just below the scalp, were slightly enlarged and were tender. His temperature was lower than on the previous day, being slightly over 101° F. On December 21 the temperature was a little over 99° F. His urine was found to be normal. The rash was a little less bright than on the previous day, and his pains were not severe. The next day the temperature was normal, but in the evening it rose to 100.6° F. On December 23 the morning temperature was 98.9° F., and in the evening it rose to 101.8° F., and he felt ill, with loss of appetite and pains in the back. The rash had faded slightly. On December 24 the morning temperature was 99.3° F., and he said he had slept well. A blood film was taken, and showed no malarial parasites. The evening

temperature was 101.2° F. The temperature continued to fall gradually from now onwards. On December 27 the back pain had nearly gone, the rash was still visible on the chest, arms and abdomen, but had disappeared from the palms. On December 29 no trace of the rash was visible. The pulse was not noted until December 21, when it was 54; it remained slow in the mornings, varying from 48 to 68. The evening pulse rate was not recorded. The accompanying temperature chart shows the course of the fever.

This case reminded me of an attack I myself suffered from in January and February, 1918, in Coomassie. The attack began suddenly on January 29 with rather severe pain in the knees, quickly succeeding by aching pain in the back from the shoulders to the pelvis. The temperature was 102° F. A similar rash to that described above, though with less closely set macules, appeared next morning. On January 31 the rash was a profuse roseola on the



Temperature chart of a case of fever resembling dengue.

chest, abdomen and arms, the evening temperature being 100.6° F. On the morning of February 1 the temperature was normal, the rash remaining the same. The particular symptom was the severe aching pain in the back. The rash lasted about five days, and was not followed by desquamation. There was no second rise of temperature. Blood films taken on January 30 and subsequently showed no malarial parasites. Five grains of quinine were taken on January 29, and daily afterwards. No other drugs were taken except 10 gr. of phenacetin occasionally to relieve the back pain. At this time there was an epidemic of apparently typical measles with well marked catarrhal symptoms among the native troops in Coomassie. As I had had measles in childhood and had no catarrhal symptoms throughout this short illness, but had quite severe headache, I regarded the attack as probably dengue.

NOTES ON SOME LATER SIMILAR CASES.

In April, 1921, at Koforidua, a town in the forest about fifty miles north of Accra, I saw four other cases, all Europeans, at various periods of the illness.

The following are brief notes of these cases, which appear to be similar to the above described cases:—

Case 1.—T., male, aged about 27. Seen by me on April 4. He said that his illness began about March 28 with malaria-like pains and, he thought, some fever. There were no catarrhal symptoms. The rash appeared about the third day. On April 4 the rash showed characters intermediate between scarlet fever and measles. The patient said he had suffered from dengue when in the East, and recognized this as similar, but had the impression that one attack of dengue conferred immunity for life. No record of his temperature had been kept.

Case 2.—B., male, aged about 30. Seen by me on April 7. He said that the illness began on April 4 with headache, pains in the back and legs and below the occiput. He had also a sore throat for the first two days. On April 7, when I first saw him, he complained of aching pain in the lumbar region and stiffness in the neck, and especially of a feeling of extreme lassitude. His temperature was normal. The blood showed no malarial parasites. No rash was visible. On April 11 I saw him again. He said that after my visit on the 7th a rash appeared. On examination a rash was evident on the abdomen, arms, back and legs, and was similar in appearance to that of Case 1. He was now nearly free from pain.

Case 3.—D., male, aged about 30. Seen by me on April 11, having come thirty miles on a motor cycle. His temperature was 100° F. There was a rash on the abdomen, ribs and back similar in appearance to that in Cases 1 and 2. Some petechiæ were also present. He said that he first noticed the rash on April 6, and at that time had had headache. He now had a little pain, especially noticeable over the posterior part of the mastoid region.

Case 4.—E., female, married. This was her first visit to the West Coast of Africa. She had not hitherto had any fever of any kind since her arrival eight months previously. She had taken 5 gr. of quinine daily with great regularity since arrival. Her illness began rather suddenly on the morning of April 25 with headache, pain in the back and limbs, and a temperature of 102.5° F. She took three doses of 5 gr. of quinine that day and 5 gr. on the morning of the 26th. Seen by me about midday on April 26. There was a profuse rash, with macules and papules, on the chest, abdomen and back. There were some petechiæ about the shoulders. She said she noticed the rash on the previous day, viz., the 25th. Her face was rather flushed. There were no catarrhal symptoms. The temperature was now 101° F. A blood film showed no malarial parasites. No quinine or other medicine was given. The temperature fell in the evening to 100° F. Headache was not excessive. On the 27th the temperature was normal. The rash had extended to the arms and legs. Another blood film taken this day showed no malarial parasites. The body pains had gone. Headache was rather troublesome. On the 28th the temperature was still normal and her general condition was much better. On this day I was relieved of my duties, and so could not

follow the case further. The rash in this case was similar to that described in Case W. L. B., but more papular.

Two other cases were mentioned to me as having recently occurred in the district, but I had no opportunity of making inquiries.

An interesting series of six similar cases occurring in Accra between September 25 and November 23, 1917, was briefly reported in December of that year by Dr. C. V. LeFanu, Senior Medical Officer, West African Medical Service, Gold Coast.

Reference to these and other similar cases, occurring in this country, are made by Dr. J. W. Scott Macfie, Director of Medical Research, Gold Coast, in his annual report of the Accra Laboratory for 1920.

THE TREATMENT OF FLUKE DISEASES.

By F. G. CAWSTON, M.D. Cantab.

First Streatfield Research Scholar.

THE prophylactic treatment of diseases caused by flukes resolves itself into the destruction of the intermediary hosts and the avoidance of the water in which they are found, or vegetables on which the cercariæ might encyst. I have found various species of fresh-water snail living on the watercress in the Durban suburbs, and a large proportion of these were infested with the cercariæ of *Schistosomum hæmatobium*, which is much more common than *S. mansoni*, which also exist in these pools. I have also found the cercariæ of *Fasciola gigantica* which I obtained from this same locality encysted on lettuce, though I have also found an encysted cercaria besides the free-swimming cercariæ within *Limnæa natalensis*; for they sometimes encyst on the shell.

It is remarkable that semi-stagnant pools so heavily infested with fresh-water snails should be allowed to remain in close proximity to Durban, and that white boys should still be seen bathing in these pools throughout the hotter season of the year. In fact, the vast majority of vegetables consumed by the Durban population is obtained from those localities which are my favourite hunting-grounds for snails infested with the cercariæ of various trematode worms.

Since a farmer at Lake Chrissie in the Transvaal directed his attention to the fresh-water snails, after I had isolated the cercariæ of *F. gigantica* in *L. natalensis* on his fluke-infested farm, and made use of copper sulphate solution in the pools, he has not been able to secure for me any further specimens for microscopic examination.

In marked contrast to the neighbouring pools which swarm with badly infested snails, I have not been able to find one fluke-infested snail in the Indian's pool at Sydenham since he introduced some white duck at my suggestion in August, 1919. Nor would these birds appear to have the slightest effect on the number of fish which may also be regarded as a means of keeping collections of water free from fresh-water snails and other evidences of stream-pollution.

The treatment of THE BILHARZIA CARRIER is undoubtedly an important point to consider in the control and possible eradication of these chronic diseases from a country. And this has been well emphasized by Dr. J. B. Christopherson in advocating the antimony treatment for bilharzia disease in Egypt. It is brought out more clearly in a new country where the introduction of a bilharzia parasite for the first time is calculated to be marked by a virulence which is characteristic of the outbreak of any disease on virgin soil. This virulence may be expected once the parasite has become used to its new intermediary hosts and has proved itself capable of attacking the population. We have just such an example at Durban at the present time. Up till June of this year no case has ever been reported where a patient who has never left South Africa has been shown to harbour *S. mansoni*. We now know that not only does *Physopsis africana* harbour both *S. hæmatobium* and *S. mansoni*, as shown by Dr. E. C. Faust in *Parasitology* for September, 1920, but that the European schoolboys who bathe in the pools from which these snails were collected acquire and spread infection with both parasites.

I have under treatment at the present time a boy of 12½ who manifests both lateral and terminal-spined ova in his urine and lateral-spined ova in his fæces, as a result of bathing in these pools at Mayville, near Durban, in 1920, and I have observed the same degenerative process going on in the miracidium contained in the lateral-spined ovum under the influence of ipecacuanha as I have seen when patients harbouring the spine-pointed ova alone are treated with injections of the drug.

By following up a series of 100 cases of infection with *S. hæmatobium* which have been treated with freshly dissolved tartar emetic powder given intravenously I have already demonstrated the undoubted value of this method of treatment, which Dr. J. B. Christopherson established as the routine one for the affection in Khartoum, so far as South Africa is concerned, and have shown that where treatment along the lines I have adopted in Natal is continued for a complete month, the patient who harbours *S. hæmatobium* in South Africa is no longer capable of spreading the infection. Although I have not been able to follow up an equal number of such cases which have been treated with ipecacuanha at present, it would appear, from those cases that I have treated so far, that this remedy is equally effective in completely eradicating the infection with *S. hæmatobium*. In view of the degenerative changes that I have observed in the lateral-spined ovum of *S. mansoni*, there is reason to believe that the drug is equally effective in eradicating this parasite of the bowel wall in Natal, and, as emetine has proved of such value in the treatment of amœbic dysentery which sometimes affects persons harbouring *S. mansoni*, emetine may well be recommended in the treatment of patients harbouring *S. mansoni*, even though it is so much more expensive than tartar emetic. Given intramuscularly in gradually increasing doses one avoids the sudden cardiac depression that intravenous in-

jections produce without experiencing less effect so far as the destruction of either *S. mansoni* or *S. hæmatobium* are concerned, and here again a 1 per cent. or 2 per cent. solution of carbolic acid may well be used to diminish the slight soreness which intramuscular injections of emetine cause, if given daily or on alternate days.

In the JOURNAL OF TROPICAL MEDICINE AND HYGIENE for March 15, 1921, I reported the successful treatment of a patient who had contracted the affection with *S. japonicum* in China seventeen years previously. Dr. J. B. Christopherson has kindly written to tell me that he has had an opportunity of examining the fæces of this patient on several occasions since his return to England and that, as he could find but one dead ovum, it appears that antimony has been successful in producing a permanent cure of this case. A negative result was also obtained by Dr. W. A. Murray with the antigen test on December 2, although the result was positive in this case at the commencement of the month's treatment.

The value of antimony in the treatment of disease due to these three common human schistosomes suggested that it might be of equal service in the treatment of cattle and man infested with *F. hepatica* and, in view of the expectorant action of antimony, that it might prove of even greater service in the treatment of the disease of Korea and Japan due to the presence of the lung fluke, *Paragonimus westermanii*. As it is only occasionally that Japanese patients are admitted to the Durban hospital, and I have been unable to determine the presence of fluke infection in any more cases from the Far East, although a Chinaman with peritonitis of obscure origin gives a weakly positive reaction to the bilharzia complement-fixation test, I am hoping that this problem will be investigated in Japan.

In regard to the use of antimony in the treatment of liver-rot, Mr. H. H. Curson, M.R.C.V.S., undertook some experiments for me at Grahamstown last October. The sheep stood the injections which were given intravenously quite well, and no flukes were found post-mortem in those sheep which had received the full series of injections, whilst a large number of controls were found infected with *F. hepatica*; but it was not found possible to determine for certain that those sheep that were treated really harboured flukes before treatment was commenced and the experiments need repeating.

Towards the expenses connected with this research a grant has been received from the British Medical Association.

FURTHER CASES OF BLACKWATER FEVER IN THE BRITISH SOLOMON ISLANDS.

By NATHANIEL CRICHLAW, M.B., Ch.B. (Glasgow).
Government Medical Officer, British Solomon Islands
Protectorate.

IN my previous paper I dealt with blackwater fever in the British Solomon Islands between the years 1910 and 1920.

I shall now deal with the cases of blackwater fever which have occurred during the months January—April of this year. To my knowledge there have been four cases of blackwater fever. Of these cases, two were treated, both of which died, and two untreated, one of which died. Of the untreated case that recovered it is very doubtful whether this was really a case of blackwater fever. The layman very often mistakes a severe attack of malaria for blackwater fever.

Thus out of four cases there were three deaths, giving a mortality of 75 per cent.

For January—April of this year there were six deaths in the Protectorate. Of these deaths blackwater fever was responsible for three, giving a percentage of 50.

I stated in my previous paper as my opinion that I firmly believed that blackwater fever was a disease introduced into the British Solomon Islands, and I gave reasons for coming to this conclusion. Since writing this paper I have obtained one piece of information which supports my view. In speaking with "an old stager" here, he said that blackwater fever was unknown in the British Solomon Islands until a certain gentleman some years ago died from the disease. This gentleman had the disease previously in West Africa. This was the first known case of blackwater fever in the British Solomon Islands.

Could not the disease have been introduced by him and others who had the disease previously in other tropical countries?

It will thus appear that blackwater fever is an importation from West Africa.

With regard to the prognosis in blackwater fever, this fact must be mentioned, viz., that the alcoholic has as much chance of recovery as the non-alcoholic. I have seen the non-alcoholic succumb to the disease while the alcoholic recover. Of the three deaths for this year two were non-alcoholics.

The four cases of blackwater fever are as follows:—

Case 1.—Male. Plantation manager. Resident in Solomons five months. Untreated. Died.

Case 2.—Male. Planter and trader. Resident in Solomons ten years. Untreated. Recovered. Doubtful case of blackwater. Was only ill for three days.

Case 3.—Female. Missionary teacher and wife of a medical missionary. Resident in Solomons 8—9 years. Treated by her husband, who is a qualified medical practitioner. Died.

Case 4.—Male, aged 19 years. Storekeeper. Resident in the Solomons 18 months. Treated at the Government Hospital, Tulagi. Died.

This case was admitted on February 10 at 5 p.m. complaining of fever and passing blood-coloured urine.

History of present complaint.—Patient felt off-colour the evening before, so he took 10 gr. of aspirin and went to bed. In the morning he felt better and went to work. At luncheon time he suddenly had a severe rigor and on passing water noticed that it was blood coloured. He was then removed to the hospital.

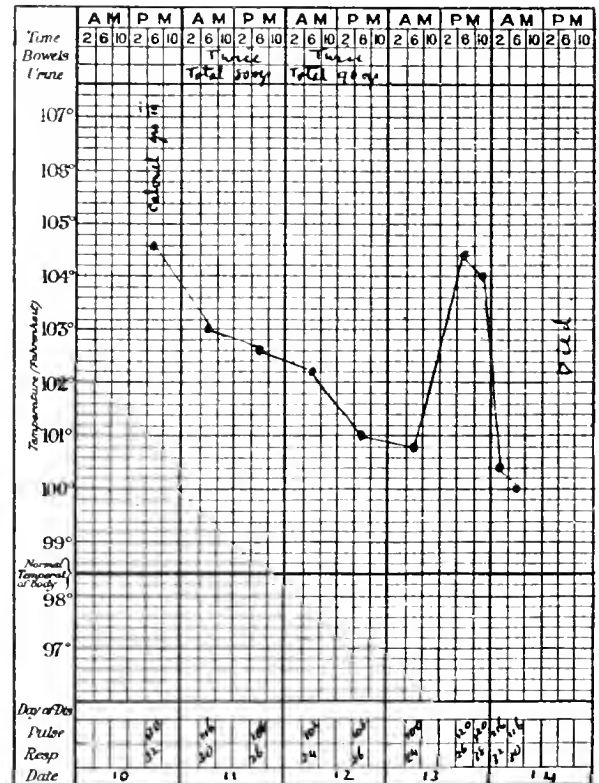
Past history.—He arrived in the Solomons about

eighteen months ago. Four months after his arrival he suffered from attacks of low fever, which he could not get rid of and which undermined his health. He was given an intramuscular injection of quinine bi-hydrochloride—1 grm.—and a tonic containing quinine, arsenic and strychnine. This cured his low fever and he was in splendid health for nine months after. About a month previous to his attack of blackwater fever he had an attack of malarial fever, which he got rid of by taking quinine.

Previous to his attack of blackwater fever he said he never felt better.

He was not a regular quinine-taker and only took quinine when he had an attack of fever.

Patient was non-alcoholic and lived a very straight life.



Condition on admission.—The patient's general physical condition was good. He was very anæmic and slightly jaundiced. Pulse 130. Temperature 104° 8' F. There was no vomiting.

Urine.—The urine was passed freely and without any difficulty. The urine was dark red, like claret, and contained much albumin.

Blood.—The blood was very thin and watery, and by Tallquist hæmoglobin scale was 40. There were no malarial parasites, but there was a leucocytosis.

Treatment.—The lines of treatment adopted were as follows: 3 gr. of calomel followed by a saline aperient. Sternberg-Hearsey's mixture and rectal saline injections every four hours. Abundance of fluids administered by the mouth.

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THE JOURNAL OF

Tropical Medicine and Hygiene

OCTOBER 1, 1921.

"MANNA FOOD."

IN articles in the public press we see considerable space and prominence being given to a substance termed "Manna Food." The heading to the article is further "strengthened" by such statements in large type as "Products of the Soya Bean" and "Bread, Flour and Milk." A heading

February 11.—Jaundice extremely marked. Urine passed freely without any difficulty. 80 oz. passed within twenty-four hours. No change. Patient vomited once a great quantity of bilious material.

February 12.—No change in urine. Was passed freely, but with slight pain. 90 oz. passed within twenty-four hours. He vomited again some bile. Patient drowsy all day.

February 13.—Urine passed freely, but with pain. Urine slightly darker. Vomited once again some bile. Patient very drowsy-looking. In the evening had a rigor and temperature rose to 104.2° F. 7 p.m.—Pulse became very irregular and weak and patient became very blue in the face and breathed with difficulty. Strychnine and digitalin administered. Pulse and breathing became better. 8 p.m.—Patient semi-unconscious. Two pints of Burroughs, Wellcome and Co. Ltd. saline compound and two c.c. colloidal arsenic administered intravenously. Pulse and breathing improved. 11 p.m.—Patient very restless. Morphine $\frac{1}{4}$ gr. and atropine $\frac{1}{50}$ gr. given.

February 14. 2 a.m. Pituitary extract given hypodermically. 6 a.m.—Strychnine and digitalin. Patient quite unconscious. Cannot retain any fluids by mouth or per rectum. Breathing stertorous. Passed urine in bed. 10 a.m.—Pituitary extract. 3 p.m.—Patient passed good deal of urine in bed, but with great pain apparently. 7 p.m.—Patient died.

Notes on Treatment with Emetine at the University War Hospital, Southampton (Margaret W. Jepps, *Journal of the Royal Army Medical Corps*, No. 6, vol. xxxvi).—Salol-coated pills of emetine bismuthous iodide proved unsatisfactory; 45.1 per cent. (at least) of twenty-six cases relapsed after a twelve days' course of 36 gr.

An emulsion of E.B.I. in liquid paraffin gave much better results. Of sixty-three cases given a twelve days' course of 36 gr. only 12.7 per cent. relapsed. After re-treatment of a few of these relapsed cases with a double course 11.1 per cent. were still uncured. Further analysis of these figures shows that of fifty-seven cases showing no intestinal symptoms, or only slight symptoms, 3.5 per cent. had not been cured; while of six acute and subacute cases five, or 83.3 per cent., had remained positive.

Injections of emetine hydrochloride were found very useful in cases where the E.B.I. treatment could not be tolerated. Three out of five cases were cured by a course of twelve daily injections of 1 gr. each. The treatment proved beneficial to the patients' general condition, and there were no permanent ill-effects.

Recent Experimental Studies on Yellow Fever (H. Noguchi, *American Journal of Hygiene*, 1921, vol. i, No. 1).—The author gives a description of all his investigations on yellow fever with accompanying microphotographs illustrating the character of *Leptospira icteroides* as occurring in sections of tissue stained by Levaditi's method.

in italics is given by way of introduction to the subject, in which a Dr. Laszlo Berezzeller, who is recommended as an assistant to the late Professor Franz Tangl, is responsible for the great discovery. We have read some of these newspaper articles, but confess that we are not impressed with the manner in which this "Godsend" to man's diet is introduced. The very baptismal name—Manna—can scarcely be said to bear the stamp of science, but of advertisement rather, of what might be regarded of the German laboratory type—a type that does not commend itself to science beyond the chemical composition of what has hitherto been obscure. To, however, acclaim the laboratory products in this case, as in many other "discoveries" in German laboratories, is to repeat the gullibility of the pre-war public to treat everything that is issued from the laboratories of the great German chemists as a world wonder. The chemists in Germany before 1914 had the world at their feet; such men were avowed to have no equal; their researches were thought beyond the powers of men of other nations, and everything they placed on the market commanded a sale. Commanded is the correct word to use, for were not their productions the final word in chemical research, and therefore to be used because they had created it? They belonged to a class whose ultimate aim was substitution. Chemically compounded quinine was put on the market to supplant that supplied by Nature, the only difference being that Nature's production cured malaria and the laboratory form has not been proved to do so, yet it was put on the market with what smothering of conscience on the part of the producers and retailers of the drug history does not say. They produced wines in their pre-war days that had never seen the grape, and sold it by the million bottles in Britain and other countries. We were flooded in this country with Sanatogen; with "Lysol" in our hospitals; with preparations of medicinal products in such number that the vocabulary was well-nigh bankrupt of baptismal names for them. Other nations imitated them after a fashion, the French gave us the "Soured Milk" treatment, which, like several German preparations, covered the world with whirlwind velocity, only to die down in the opinion of a disappointed public. American preparations, such as "Grape Fruit," "Quaker Oats," "Puffed Wheat," gained entrance to our larders, and continue to do so in spite of common sense. Now comes the turn of "Manna Food." The sentiment which surrounds the word "Manna" is calculated to enlist the interest of all and sundry; the still very indefinite knowledge attaching to the explanation of the legend its name suggests has a fascination altogether apart from the properties it acquired for the relief of hunger to the Israelites in the wilderness of Sinai. Manna is still the name given to a sweet gum distilled in hot weather from the tamarisk tree in a limited locality of the Arabian desert. It is found only under the tamarisk tree, it melts as soon as the sun is up; but this material

could not form a staple food of life. According to our text-books of materia medica, manna is "a concrete saccharine exudation, obtained by making transverse incisions in the stems of cultivated trees of the *Fraxinus ornus*, which have their habitat in Calabria and Sicily. It consists principally of 70 per cent. of a peculiar sugar *mannite*, cane-sugar and indefinite matter. Its medicinal properties are those of a mild laxative to children, and being readily dissolved in milk, is given with cow's milk in infant feeding-bottles.

What the true "manna" and the food derived from the soya bean of North China have in common is not perceptible.

The manna food derived from the soya bean contains 40 per cent. albumen and 20 per cent. of fat. One naturally asks what is the variety of albumen found in the bean? Vegetable albumen in the form of legumin is of all forms the most indigestible, and the soya bean albumen belongs to that category.

A milk can be made by grinding up soya beans with a small quantity of water, and then adding enough water to make an emulsion. D. F. Ritchie adds to this statement that soya beans as such cause considerable gastric disturbance.

Under the name of Solae a synthetic milk is on the market; it is made as follows: Soya beans are ground to a coarse flour, and stirred vigorously in an alkaline solution to extract the soluble proteins. The oil, which is nauseous to the taste, is carefully removed. Finally, arachis and sesame oils, dextrin, and the remaining salts of milk are added; after emulsifying boracic acid lactate is added.

The following statement is culled from that encyclopaedia of knowledge, Martindale's "Extra Pharmacopoeia," edition 17, vol. i, 1920:—

Soya Bean.—*Glycine hispida* (*Leguminosae*). This bean is extensively cultivated in China and Japan for human consumption and latterly in America and Europe, chiefly as a forage crop, is eaten as a vegetable, in soups, sometimes pickled green, boiled and served cold with a sprinkling of soy sauce, and sometimes as a salad. A favourite method of preparing in the East is to boil until soft and place the resulting mass in a warm cellar until it ferments—the resulting "cheese" being known as "Natto."

"Analysis of the bean calculated on water free basis, indicated 38.5 per cent. protein and 20 per cent. fat. It is probably due to this large amount of easily assimilable nitrogenous matter that the Chinese and other rice-eating people require so little meat. It contains practically no starch—the latter fact is said to be due to presence of a diastase in the bean capable of converting starch formed, two-thirds into sugar, one-third into dextrin. Has been used as an addition to ordinary diabetic dietary—the beans may easily replace the gluten of bread—causes reduction in percentage of sugar.—L. ii./10,1844. Soy Flour is even more serviceable, containing almost one-third more protein than the bean, this being due to the removal

of the fibrous hulls, which contain but little protein.—B.M.J.E. i./11,80.

"The protein of the bean is being extensively used in connection with the treatment of diabetes and malnutrition. Soya Bean Meal from which it is made must be carefully examined for the toxic *Java Bean*.—F. W. Crossley Holland, P.J. ii./12,154. Soya beans average 8 mm. in length and 7 mm. in breadth and 6 mm. in thickness. They are roundly ovoid in shape and about 99 per cent. are pale yellow in colour—there being a few darker coloured, smaller and more elongated. Soya Bean Cake and Meal is enormously adulterated.—T. E. Wallis, C.D. ii. 13,278; P.J.ii. 13,120.

"E. S. Peck states *Glycine hispida* has been used in clinical experiments for the splitting up of urea into ammonium carbonate.

"Synthetic milk has been made from the bean.

"Sarton is a preparation of the bean for use as a diabetic food."

These quotations and notices are a few examples of some of the work already done on soya bean.

In China there are few housetops on which jars and pots of fermenting soya are not to be found. The odour declares their presence. There is scarcely a meal in China that soya sauce is not on the table. There is scarcely a table sauce in Europe in which this ever prevailing product of soya does not play an important part.

The present enthusiasts as to soya bean and its uses, i.e., Dr. Berezeller and Mr. Robert Graham, are now advocating the bean as a food for human beings. They have found, as far as I can discover, nothing new either in its composition or in the uses to which it is being put. We are sure they will pardon us if we are wrong in our surmise, but we have only read newspaper reports under such a legendary heading as Manna Food. With that we are at variance. "Dr." before one of these gentlemen's name cannot surely indicate that he is a doctor of medicine, for we hope the medical profession has not come down to advertisement dabbling of the kind.

Pardoning this error of judgment, and if it is meant merely as a physiological stop-gap during famine, the world will thank the originators, and we beg to withhold all criticism; but if they mean they have found a scientific material as a really useful and hygienic food we beg to differ. It is not, moreover, in every part of the world that the soya bean can be cultivated to perfection. In England the seed has often been sown; it grows well up to a certain stage, but it does not reach fructification. It grows as maize does in the South of England in certain places, but like maize it does not ripen. As a green food for cattle it is excellent, and it is in some districts proposed to regularly use the bean as a rotation crop. In the opinion of many agriculturists, few of our home-grown feeding stuffs approach the soya bean in value. Other recommendations which tell largely in favour of the bean are: (1) That it is admirably adapted to enrich the soil with nitrogen; (2) that as the food of the white race is very costly, especially

when one compares it with the food which the yellow race is accustomed to, it will in price suit the meagre resources of the middle classes at the present day. In the words which conclude this part of the article by Dr. Berezeller we leave the subject for the present. "It is therefore a matter of the highest political importance that the West should learn the lesson of cheaper living as taught them by the East in the adaptation of the soya bean as an article of food. Given the existing situation on the Continent, this is the only real solution of the problem of reconstruction."

J. C.

Annotations.

Relapsing Fever in Peru (E. Del Prado, *An. Facul. de Med. de Lima*, vol. iii, Nos. 16-17).—The author gives a full description of relapsing fever in Peru, and comes to the conclusion that lice are the sole carriers of the disease in that country, and that the best treatment is neosalvarsan, which, if applied promptly and systematically, destroys the spirochæte and renders the prognosis favourable.

Comparative Specific Characters of Spirochæta icterogenes and S. hebdomadis (R. Kaneko and S. Morihana, *Ztschr. f. Immunitätsf. u. Experim. Therap.*, 1921).—The object of this paper is to compare the organism *Spirochæta icterohæmorrhagiae*, *S. icterogenes* and *S. nodosa*, and their relationship to *S. hebdomadis*, the causative agent of Japanese seven-day fever, by serological methods. The question is considered from the points of view of culture, pathogenicity, morphology and serology. In culture, although all the organisms grow readily, *S. hebdomadis* survives longer than any of the others. In animal experiments, guinea-pigs infected with Weil's disease usually die, after contracting jaundice and hæmorrhage. On the other hand, after infecting with *S. hebdomadis*, the animals generally recover, with no signs of either jaundice or hæmorrhage. Morphologically, the organisms are very similar, and can hardly be distinguished at all; also serologically, the investigations reveal very little difference between *S. icterohæmorrhagiae*, the Japanese disease and *S. icterogenes*, the European kind, commonly termed Weil's disease, but these diseases are quite separate from seven-day fever. It is concluded that the Japanese and European Weil's disease are caused by the same organism, whereas the spirochæte of seven-day fever is a different organism altogether.

Typhoid Lung Lesions (A. Lemierre and P. N. Deschamps, *Presse Médicale*, April, 1920).—It has been noted that during the course of typhoid or paratyphoid a cavity may develop in the lung; this may be due exclusively to typhoid or paratyphoid origin, but the differentiation is only possible by

noting whether there is absence of tubercle bacilli or not from the sputum. During the war many cases were diagnosed as tuberculosis owing to the tuberculous lesions in typhoid cadavers.

Serum Fastness of Relapsing Fever Spirochaetes and Recovery from Infection occasioned by them (H. Toyoda, *Kitasato Arch. of Experim. Med.*, 1920, vol. iv, No. 1).—The author describes experiments made in order to try and discover the mechanism of spontaneous recovery in relapsing fever. Phagocytosis plays a very unimportant part in the disappearance of spirochaetes from the blood, the serum of which becomes definitely spirochaetocidal. The spirochaetes which persist after an attack are to a certain extent serum-fast, owing to a kind of protective covering, and also to the fact that they secrete a substance which neutralizes antibodies. The serum-fast organisms multiply and give rise to relapses. After each attack the spirochaetocidal properties of the serum increase till in the end resistance of the spirochaetes is overcome and recovery ensues.

Yellow Fever in the Belgian Congo (G. Deprez, *Ann. Soc. Belg. de Med. Trop.*, 1920, vol. i, No. 1).—The author describes an outbreak of yellow fever in Matadi in the Belgian Congo in 1917. The disease was carried by ships visiting the port and resulted in six cases. The first four cases were fatal, but the other two were treated with novarsenobenzol and recovered. All the symptoms and pathological findings were characteristic of the disease. The outbreak did not spread any further owing to the adoption of preventive measures.

Yellow Fever: its Distribution and Control in 1920 (W. C. Gorgas, H. R. Carter and T. C. Lyster, *Southern Medical Journal*, 1920, vol. xiii).—A description of the history of yellow fever is given and of methods adopted to effect its control, the results so far obtained justifying the hope that the disease may be ultimately stamped out altogether.

Yellow fever areas have been enormously reduced in size; those now existing, with the exception of the Yucatan Peninsula, are well under control, and reasonable hope exists of eventual elimination. Epidemics are becoming less and less widespread, due to the intelligent methods of combating the disease now in force, which consist of walling off the infected areas and lowering the Stegomyia index around them. The aetiology, pathology and treatment—both curative and preventive—are being rapidly put into conclusive form. It is believed that anti-Stegomyia campaigns alone are sufficient for the elimination of the disease.

Spirochaetes in the Intestinal Canal (J. W. Langendorfer and Peters, *Münch. Med. Woch.*, January, 1921, vol. lxviii, No. 1).—The authors describe a case of dysentery, the symptoms of

which were in no way attributable to pathogenic bacteria or amebae. Spirochaetes were present, however, in enormous numbers, and treatment was made by intravenous injections of salvarsan with a completely successful result, the spirochaetes disappearing entirely.

Glycosuria in Neurosyphilis (C. I. Urechia and A. Josephi, *Annales de Medicine*, February, 1921).—The authors report ten cases of glycosuria found with insidious neurosyphilis in Roumania. The glycosuria was mild and intermittent, but the pupils and lumbar puncture fluid testified to the neurosyphilis, and under specific treatment the glycosuria disappeared.

Studies on Bacterial Nutrition. Growth of Bacillus Influenzae in Haemoglobin-free Media (Theodor Thjötta, M.D., *Journal of Experimental Medicine*, vol. xxxiii, No. 6, June, 1921).—It is shown that *Bacillus influenzae* will grow profusely in haemoglobin-free media consisting only of plain broth and emulsions or extracts of mucoid bacilli and *B. proteus*. The emulsions and the extracts can be boiled and filtered through Berkefeld filters without losing their growth-inducing property. The growth-stimulating effect of the bacterial extracts is possibly due to substances belonging to the class of the so-called vitamins.

Fishermen's Diseases (H. Muir Evans, *Lancet*, vol. i, p. 517, 1921).—A description is given of the effects of the sting of the greater and lesser "weever" upon fishermen. These fish are armed with a perfect double-grooved exploring needle on either gill cover, and at the root of these spines is a definite poison-gland. If the fish is alarmed it erects its gill-cover and drives the poisoned spine into any adjacent body, which at once receives some grumous drops of a highly poisonous nature. The result is a severe burning pain, which lasts for several hours, immediate swelling appearing round the wound, and a certain amount of paralysis of the limb occurring. This swelling may subside in a few hours, but it may go on to phlegmonous inflammation with local gangrene around the site of injury. Fish-venom, like snake-venom, is rapidly destroyed by potassium permanganate and chloride of lime.

In summer voyages the fishing nets get full of jelly-fish which sting badly, causing burning pain and afterwards intense itching. After the summer voyages the nets are repaired, and this brings on so much laceration and sneezing that it sometimes has to be discontinued. This is due to the fact that while being mended the dried toxin and dust adhering to the mesh is shaken into the air.

Boils are very common with fishermen, being most frequent in the winter and autumn, and being due to the constant rubbing of the skin against the edges of the "oilies," the salt water and the dirt incidental to fishing.

Abstracts and Reprints.

ULCERATING GRANULOMA OF THE
PUDENDA CURED BY INTRAMUSCULAR
INJECTIONS OF ANTIMONY TARTRATE.¹

By H. LOVETT CUMMING, M.D.

ULCERATING granuloma is now generally considered a venereal disease. In the great majority of cases it commences somewhere on the genitals, usually on the penis or labia minora, or on the groin, as a papule or small nodule. The epidermis over this gradually becomes inflamed, thinned out, and excoriated, and the surface breaks down to form an ulcer. The resulting ulceration is seldom deep. The disease either spreads by eccentric peripheral growth or by auto-infection from an apposing surface.

The affection is probably of protozoal origin, but so far nothing definite has been established. Some writers have described a spirochæte as the cause, while Donovan found present in lesions certain bodies resembling "gigantic bacilli with rounded ends." Siebert found, in all instances, similar bodies in material from various countries, but called them diplococci.

On the other hand, spirochætes have only been found in a certain number of cases, and when these have disappeared after salvarsan treatment the disease has still continued. In fact, salvarsan and allied preparations in the treatment of this disease have been either altogether useless or extremely disappointing.

I have seen several cases where the disease was quite uninfluenced by intravenous injections of salvarsan, which, with the more extensive experience of other writers, goes far to prove that, in any case, the origin of the affection is unlikely to be spirochaetal. The incubation period is uncertain. It is not referred to in any of the well-known text-books. In the case about to be described it was at least four weeks. Probably, in most cases, it is never likely to be much shorter than that period.

It is only within very recent years that antimony tartrate has come to be used in various diseases, chiefly tropical, which have hitherto resisted, almost completely, all previously known forms of treatment. This drug has been given with great success in kala-azar, Delhi boil, trypanosomiasis, bilharziosis, yaws, certain forms of syphilis, and in ulcerating granuloma of the pudenda.

During the summer of 1916 the writer saw a very advanced case of the latter disease cured at the Albert Docks Hospital by intravenous injections of antimony tartrate. This case was fully reported by Low and Newham in the *British Medical Journal* of September 16, 1916, p. 387.

The following case is of particular interest on account of the method of treatment used and its complete success with comparatively small amounts of the drug introduced into the system.

S. H., an American, first consulted me on September 8, 1919. He was suffering from chronic gonorrhœal discharge—a thick yellow "bonjour drop"—which had been present off and on for nearly a year; also from several soft sores, three in number, with hard edges, situated on the dorsum of the penis in and behind the balano-preputial furrow, and involving to a slight extent the proximal end of the glans penis. There was a considerable amount of inflammation and infiltration present round the sores but no definite induration. The glands of the groin were neither enlarged nor tender.

The patient, who is a very observant and intelligent man, stated that he had first noticed on March 3, 1919—about six months previously—what appeared to be a slight abrasion, "similar to a hair cut," which he himself treated steadily for about five days with alternate applications of silvol and potassium permanganate crystals, placed between layers of damp gauze and applied directly to the suppurating area—about two fresh applications of each drug every twenty-four hours. As a result by March 10—a week later, there was closure of the raw area, but a slightly swollen and inflamed area appeared, larger than the original open area.

This condition—an inflamed, hard, raised area—continued in a varying degree until it reopened and formed a fresh sore about the end of July, 1919. At this time three distinct sores developed. He treated the condition as before, with the addition of zinc ointment. The treatment was ineffective over a period of nearly a month—that is, up to September 9, when he consulted me.

SOURCE OF INFECTION.

With regard to date and circumstances of exposure, nothing very definite was known. There were two possible exposures in the four weeks preceding March 3, 1919, one being a European and the other a Chinese (Cantonese) woman. Neither was a professional prostitute, to the best of his knowledge. This occurred in Hong Kong from December 18, 1918, to February 1, 1919. Ulcerating granuloma is quite common in South China, and amongst Cantonese prostitutes. The writer has since seen in Shanghai a Chinese woman from Canton who is suffering with this disease in a very advanced form.

CONDITION PRESENT AT FIRST EXAMINATION,
SEPTEMBER 9, 1919.

On close examination, the sore presented three definite and separate ulcerations, but the surrounding inflamed areas were practically contiguous, and the inflammation and infiltration were more pronounced at the parts more remote from the actual raw centres.

Thinking the condition was one of simple "soft sores," I prescribed "black wash" and a powder consisting of iodoform, calomel and boracic acid, in equal parts.

September 17: The sores were cleaner and smaller in appearance, and there was less inflammation present. Solution of silver nitrate, 10 per cent. was

¹ Abstracted from the *British Medical Journal*, No. 3125, November, 1920.

painted on the affected parts. This treatment was continued until September 30, when a decided improvement was noticed. Only one sore remained unhealed; this affected the balano-preputial furrow, and extended on to the posterior rim of the glans penis.

October 2: Thinking the continued gonorrhœal discharge might be the cause of the persistence of the ulcer, I passed the urethroscope. The urethra bled readily; inflammation extended back to the internal sphincter, from $1\frac{1}{2}$ in. behind the meatus; there was no sign of infected follicles. Bi-daily douches of potassium permanganate (1 in 4,000) were ordered, and a soothing diuretic mixture to be taken after meals three times daily.

October 11: Less discharge from urethra; the remaining ulcer still unhealed, but apparently healing in parts; edges ragged and irregular; same treatment continued.

October 24: Ulcer spreading slowly anteriorly, with breaking down and irregular edges, like modified granulations, deeper than before; healed and healing at the proximal end and opening up distally; no discharge. On this occasion I definitely diagnosed the condition as "ulcerating granuloma," owing to the general appearance, chronicity, and manner of spread, absence of enlarged inguinal glands or constitutional symptoms. Nothing very definite was revealed by the bacteriological examination, although some typical Donovan bacilli were found.

TREATMENT.

The treatment by intravenous injections of antimony tartrate was suggested, but, owing to the pressure of business, the patient was unwilling to go into hospital for treatment. Ordinary intramuscular injections of antimony tartrate were not contemplated, as I had just seen in consultation a marked case of the same disease in a Chinese woman, where antimony tartrate in saline solution, intramuscularly, had caused abscess formation at the seat of injection.

Local applications of various kinds were tried, with only slight improvement in the condition. At best the progress of the disease was only checked. The application which was attended with the best results was a solution of salicylic acid in ether (4 drams to the ounce), combined with mercury perchloride (0.2 per cent. in absolute alcohol— $\bar{a}\bar{a}$ 1 oz.). This reduced the granulations and dried up considerably the spreading open sore at the distal end of the ulcer. The application was painted on morning and evening.

Treatment by Antimony Tartrate (Intramuscular).

The patient was becoming very disheartened at the apparent obstinacy of the condition and at the absence of complete healing. Just at this time I received from home the latest edition of Castellani and Chalmers' *Manual of Tropical Medicine*, and discovered there under treatment for yaws and oriental sore (*vide* p. 2174), a formula for administering antimony tartrate by intramuscular injection without any unpleasant results. This had been used successfully in the treatment of yaws even in young children.

Castellani's No. 1 formula consists of antimony tartrate with carbolic acid and glycerine—for example:

R.	Tartar emetic	...	...	...	gr. viij.
	Acid carbol.	...	...	...	" x.
	Glycerine	...	...	...	ʒij.
	Distilled water to	...	...	...	ʒj.

Dose: $\frac{1}{2}$ to 1 c.c.

He also recommends a solution by the mouth:

R.	Tartar emetic	...	...	...	gr. v.
	Sodii bicarb.	...	...	...	gr. xxx.
	Glycerine	...	...	...	ʒj.
	Aq. chloroformi	...	...	...	ʒij.
	Aq....	...	...	...	ʒij.

Dose: 2 to 4 drams three times a day after food.

Castellani holds that these combinations of antimony tartrate prove comparatively non-irritant to the muscles (intramuscularly) and to the stomach (internally), and in my experience this proved to be the case.

January 14: First intramuscular injection given—about 9 minims of Castellani's solution, equal to about $\frac{1}{2}$ gr. of antimony tartrate. This was followed by a slight bruised feeling, with some pain and stiffness in the hip and down as far as the knee, lasting for an hour. Later, the same evening, a transient rash came out on the thighs, like mosquito bites.

January 15: He commenced taking the mixture, 2 drams thrice daily. Each dose is roughly equal to $\frac{1}{2}$ gr. of antimony tartrate—that is $\frac{3}{8}$ gr. daily.

On January 16 antimony tartrate $\frac{1}{2}$ gr. was injected into the left hip; on the 18th and 20th $\frac{1}{2}$ gr. into the right hip; and on the 22nd $\frac{1}{4}$ gr. into the right hip.

The left hip still remained a little swollen and tender on pressure after No. 2 injection on January 16, but it was possible to go on injecting into the right hip without any unpleasant effects. The sore showed now, after the fourth injection, definite signs of healing. There was less thickening present at the edges and the appearance was healthier.

January 25: Owing to an attack of influenza, further local treatment was postponed. The last injection was most painful of all. Right hip very tender. Still signs of healing locally. Raised border beginning to contract and flatten out, while the sore was drying up at the same time.

January 31: Nine days since last injection. No pain or discomfort in either hip. Locally, sore healed, with exception of small area, about a quarter of an inch in length; whole area looks healthier and practically no discharge. Antimony tartrate $\frac{1}{4}$ gr. was injected into the left hip.

On February 2nd antimony tartrate $\frac{1}{4}$ gr., and on 4th $\frac{1}{8}$ gr. was injected into the right hip. On the latter date there was only a tiny place about $\frac{1}{8}$ in. unhealed; ulcer more shallow. On February 7 $\frac{1}{8}$ gr. was injected into right hip, and on the 10th the same amount into the left hip; the sore was clean, red, and healing well—less than $\frac{1}{8}$ in. long. On the 14th, $\frac{1}{8}$ gr. was injected into right hip; sore almost healed; no pain or swelling in either hip.

February 16: Small white pustule present on dorsum of glans penis, probably due to action of the drug.

This dried up and disappeared in two days, and there was no recurrence.

February 18: Antimony tartrate $\frac{1}{3}$ gr. was injected into the left hip. A small fissure of the sore was still present, unhealed. This was treated with a strong solution of salicylic acid and mercury deep into the fissure and along the right rim of healed ulcer. On this occasion there was painful swelling of the glands in both groins, but not much enlargement. There was still a slight yellowish urethral discharge in the morning.

February 25: Scar practically healed. Salicylic lotion painted on, as before. Two days later the scar showed only a slight redness of the edge, so the above lotion was again applied.

April 28: The penile sore remained healed, and the surface had assumed an almost normal appearance, except for a small shallow depression remaining to show where the original sore had been.

June 17: Nearly four months after actual healing of sore; no sign of any recurrence.

Undoubtedly the gonorrheal complication helped to aggravate the condition and retarded the healing of the ulcer. At the same time it is not unlikely that the antimony tartrate injections and the antimony tartrate taken by mouth helped to light up the old gonorrheal trouble. It is, however, unquestionable that the antimony tartrate was the only drug which had any effect upon the sore. Definite signs of healing were observed after the fourth injection, although the patient himself declared that he found improvement after the second injection.

All other local treatment was suspended while the injections were being given, with the exception of an antiseptic wash, night and morning, for the sore, followed by an application of a little dusting powder composed of equal parts of calomel, boracic acid, and iodoform, which had been previously used without the slightest effect.

Altogether, about 3 gr. of antimony tartrate were injected intramuscularly over a period of thirty-six days. Only twelve injections were given. Castellani recommends $\frac{1}{2}$ to 1 c.c. as the dose of his No. 1 formula of antimony tartrate. I began with 9 minims (about $\frac{1}{2}$ gr. antimony tartrate), and gradually went up to 1.2 c.c. or $\frac{1}{3}$ gr. antimony tartrate, for the last five injections. By mouth, roughly 27 to 30 gr. of antimony tartrate were taken over the same period. How much of the cure can be attributed to the oral administration of the drug is difficult to calculate, but it was noted that although the patient was taking 5 to 20 minims of antimony wine three times daily, in gradually increasing doses, from November 4, 1919, to January 14, 1920—a period of seventy-one days—without any appreciable effect on the condition of the sore, it is reasonable to conclude that only a very small amount of the drug, subsequently given by mouth, had any definite effect on the process of healing. On the other hand, very definite improvement took place after the fourth intramuscular injection, that is, before the drug given orally could have had time to have much constitutional effect.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.
No. 3, March, 1921.

The Megalosplenias of Unknown Origin—Infectious Megalosplenias (Jean P. Cardamatis).—In discussing the diagnosis of two cases of infectious idiopathic megalosplenias observed in Greece, the author is unable to identify the symptoms with those of any generally recognized pathological entity. The patients were sisters, aged 4 and $3\frac{1}{2}$ respectively at the onset of the disease. Both parents were perfectly healthy. The symptoms were the same in each case, and appeared in the following order: (1) Intense anæmia, (2) feverish attacks of long duration with interruptions and renewals, (3) megalosplenias, (4) tumefaction of the liver. In the older child death occurred after four years of illness, in the younger child after three years. Banti's disease and splenic anæmia were at first equally suspected. Essential differences in the order of appearance of the symptoms, the character of the fever, and the absence of icterus and ascites tended to rule out the former, though, on the other hand, the absence of myelocytes from the blood and the small number of neutrophile polynuclear leucocytes were points of resemblance. The decrease in polynuclears and hæmoglobin might equally be considered as symptomatic of leukæmia. Of the various forms of splenic anæmia, the chronic febrile type presented similarities in its early stages—characterized by emaciation, hectic fever, pallor and progressive megalosplenias—but not in the subsequent phases. Nicolle's infantile type differed in that in his cases the prognosis was good and hæmatozoa were found in the splenic pulp. In Grancher's type the emaciation and anæmia were secondary symptoms, and the anæmia was of the chlorotic order and less intense. The antecedents of the patients excluded the possibility of one of the anæmic megalosplenias or megalohepatosplenias without icterus described by Hayem, inasmuch as there was no record of syphilis, tuberculosis, typhoid or malaria. One of the children had shown definite signs of rachitis at an early age, but there was no evidence that the later illness had been influenced thereby.

Note on the Identification of the Culicidæ indigenous to France (E. Ségué).—The paper consists of a list of the characteristics of all the species of mosquito known to exist in France. To facilitate recognition they are divided into three groups—*Culicina*, *Ædina* and *Anophelina*—and both adults and larvæ are described.

INDIAN MEDICAL GAZETTE. Vol. LVI, No. 7,
July, 1921.

Relapsing Fever at Meshed, North-east Persia (J. A. Sinton, V.C., M.D.).—This paper is written to confirm and add a little to the paper already published by Fry on relapsing fever in East Persia. The author describes thirty-one cases of fever,

some of the cases being drawn from the local population and others from the troops. Twenty-one cases were treated symptomatically and ten with intravenous injections of 2 per cent. tartar emetic solution. The age of the patients varied from 2 to 50 years; no deaths occurred in any of the patients. On admission to hospital the clothing was placed in a tank and boiled, and the patients' bedding was examined daily in order to see if any lice had escaped notice. Attendants were provided with overalls, which had a drawstring around the necks, wrists and ankles, in order to prevent transmission of the disease.

Flavine in Ophthalmic Practice (Capt. P. Ganguli, I.M.S.).—*Trachoma*. The action of acriflavine in the treatment of trachoma has been investigated with the following results:—

(1) It shortens the period of treatment to an appreciable extent.

(2) It is possible to prevent the onset of complications with a systematic treatment from the beginning.

(3) The complications are quickly brought under control and stopped from further progress.

The drug is a powerful antiseptic, is non-irritant, and acts very much better in the presence of serum or tears.

Enteroptosis and Dropped Kidney: A New Method of Treatment (Lt.-Col. D. McCay, M.D., M.R.C.P., I.M.S.).—The author describes his method of treatment in patients suffering from dropped kidney. The patient is kept in bed for a month or six weeks, according to the severity of the case. The foot of the bed is raised by wooden blocks 15 to 18 in. high. The shoulders of the patient are kept low, but the head may be raised to a comfortable position by pillows. Massage of the abdomen is carried out twice daily for half an hour, olive oil being used as a lubricant in the hot weather and cod-liver oil in the cold weather. Massage is also used to the rest of the body and the muscles of the abdomen are improved by exercise. The patient is instructed to raise the legs from the bed, lying quite flat and keeping the legs extended all the time. The spinal muscles are exercised by arching the back. The bowels are kept open by suitable doses of an aperient like cascara evacuant. As regards diet, plain simple food of almost any kind is permissible. After the course of rest in bed the patient is fitted with a belt to support the lower abdomen. It is a good thing to attach a flat porous rubber sponge to the inside of the belt; this sponge is cut so as to be thick below and thin above, the lower border of the pad coming just above the pubes. This belt can usually be discarded after a month or two.

Medical News.

The Queensland Climate.—A report has just been issued by the committee appointed by the Australian Medical Conference, which met at Brisbane

last year to discuss the position of the white population of Australia. The report tends to prove that the climate and topographical conditions of North Queensland, though tropical, are quite suitable for a healthy and indeed vigorous white population.

Memorial to Nunez.—A statue has been erected at the entrance of the grounds of the Garcia Hospital at Havana in memory of Dr. Enrique Nunez, to whose initiative the construction of the hospital was due. He was, for a long time, chief of the Public Health Service.

Malaria discovered among Immigrants.—The Public Health Department at New York has received information that several cases of malaria have been discovered among immigrants arriving in that city. This disease is amongst those reportable, as it is thought that a few cases of the disease brought by immigrants might serve to start a very considerable outbreak. Physicians are reminded that the aid of the laboratory should be sought in the diagnosis of this disease.

Review.

SCURVY PAST AND PRESENT. By Alfred F. Hess, M.D. Philadelphia and London: J. B. Lippincott Company. Pp. vi+279. Price 18s. net.

By the recognition of the deficiency diseases interest has in recent years been stimulated afresh in a group of diseases which have been recognized for centuries. It has come to be realized that, in addition to the substances heretofore recognized as of essential importance in the dietary of man, namely, proteins, fats, carbohydrates, salts and water, there is still another group of substances termed vitamins, accessory food factors or food hormones, which are essential to render the diet complete or adequate. In their absence growth ceases or certain diseases known as deficiency diseases supervene. Amongst these diseases is included scurvy—a disease of ancient renown which has played an important rôle in all wars—in the campaigns of Cæsar, in the Crusades and in the Napoleonic and other wars of the last century. In the Great War it was also prevalent in the various armies, particularly those serving in the Eastern theatres of war, and was one of the decisive factors in forcing the surrender of General Townshend at Kut.

It is curious that no treatise on scurvy has been published in the English language since the classical work of Lind in 1772. The time was thus opportune for Dr. Hess, whose researches on this subject are as well known as they are valuable, to present the recent advances of our knowledge in this volume, which will appeal alike to the clinician, to the hygienist, and to the biological chemist. Dr. Hess has given us a presentation of this important nutritional disease which will rank as the standard authority for many years to come.

Original Communications.

A PAPER ON A NEW METHOD OF TREATMENT OF HUMAN TRYPANOSOMIASIS.¹

By CLAUDE H. MARSHALL, M.B., B.S.Lond., M.R.C.S., L.R.C.P.
Senior Medical Officer, Uganda.

I HAVE been instructed by the Colonial Office to give a lecture on the method of treatment of trypanosomiasis advocated by Vassallo and myself, but with your permission I should much prefer, instead of a lecture, to make the matter the subject of an informal discussion, and I shall therefore welcome your comments and criticisms on the question I am putting before you.

Trypanosomiasis throughout Tropical Africa varies not only in the matter of difference of strains, but possibly also in the degrees of virulence of any particular strain of trypanosome causing the infection.

Roughly, I suppose we may say that the mildest form of the disease occurs in West Africa, and the most virulent in Rhodesia, while the *Trypanosoma gambiense* in Uganda occupies a place between the two.

It is with the latter form of infection that Vassallo and I have carried out our experiments, but if we are correct in our ideas, the method of treatment we suggest should be equally applicable to all forms of trypanosome disease.

This method is based on two principles:—

(1) That the disease is cured, when a cure does take place, by reason of the formation of some trypanolytic antibody in the blood.

(2) That in the majority of cases of trypanosomiasis the parasite sooner or later finds a hiding-place in the cerebrospinal canal, where it remains unaffected by any drugs given intravenously, subcutaneously, or by the mouth, and that it is by its presence in this situation that it ultimately causes the death of the patient.

Let us take these two points in detail. First, as regards the formation of a trypanolysin in the blood.

Sleeping-sickness is considered to be analogous in many respects to syphilis, and in this latter protozoal disease there is no question but that definite antibodies are formed, as it is well known that, after an intravenous injection of salvarsan or neosalvarsan, the arsenic is eliminated from the blood in a few hours; nevertheless, the serum from a salvarsanized syphilitic patient possesses curative effects, when injected into another case of syphilis, even though the blood is collected so long after the injection that it is quite free from arsenic.

The suggestion that the native of some parts of Tropical Africa has become more resistant to the disease also presumes the formation of antibodies to the trypanosome; further, I believe I am correct

in saying that it has been found that native children on the West Coast may harbour trypanosomes, but as they grow up this infection dies out without any form of treatment. This can only mean that the disease is cured by the natural formation of antibodies.

A European patient of ours, a District Commissioner in Uganda, usually referred to as "Mr. X," got sleeping-sickness in July of last year, and was treated by an intrathecal injection of serum on September 24, 1920.

While at Khartoum on November 3 on his way home to Europe, his blood was subinoculated into two rats and a monkey, and one of the rats subsequently showed trypanosomes in its blood on November 30, so that these organisms were present in the peripheral blood six weeks after treatment.

On his arrival in London on December 17, "Mr. X" was seen by Dr. Prout and Professor Eyre, and as he was clinically quite well it was decided to give him no further treatment.

Since then Professor Eyre has made microscopical examinations of his blood and cerebrospinal fluid on five occasions, the last time being at the beginning of this month, and eighteen animals, chiefly rats, have been subinoculated.

All examinations have proved negative, and the patient, who in September last was very ill, is now perfectly well.

Clinically he has had absolutely nothing in the nature of a relapse since he recovered from the effects of the injection ten months ago, which is the only treatment he has received.

Professor Eyre agrees that this history is explained by the suggestion that the treatment given raised the patient's resistance by causing increased formation of antibodies, which subsequently continued gradually to kill off the trypanosomes in his system.

The second point is that the trypanosome becomes secluded in the cerebro-spinal fluid and remains there immune to ordinary medication.

Professor Halliburton, who is acknowledged as the authority on cerebro-spinal fluid, states quite definitely that the action of the choroid plexus is that of a filter which prevents any drug circulating in the blood-stream from reaching the cerebro-spinal fluid, with the exception of alcohol, and the destruction of trypanosomes in the spinal canal, by means of massive doses of alcohol by the mouth, even if destruction could be so effected, would in these days, though doubtless an agreeable form of treatment, be an extremely expensive one.

Evidence on this point is given by some of our cases.

A man with trypanosomes in his gland juice was given 0.6 gm. of neokharsivan intravenously on July 10, 1919, and on October 28, three and a half months after the injection, while no parasites could then be found in his gland juice, living trypanosomes were obtained in his cerebro-spinal fluid.

In another case living trypanosomes were seen in the cerebro-spinal fluid three months after an injection of 0.6 gm. of neokharsivan, although none

¹ A paper read before members of the West African Medical Service at the London School of Tropical Medicine on Friday, July 29, 1921.

could be found by repeated examinations of the blood and gland juice.

A man with large typical glands in neck had numerous trypanosomes in his gland juice on June 14, 1920. 0.6 gm. of neokharsivan were injected into a vein, and three days later living parasites were recovered from the cerebro-spinal fluid, and an exactly similar condition was recorded in another case.

Injections of 0.6 gm. of neokharsivan were sufficient to sterilize the blood-stream, but had no effect on the trypanosomes in the cerebro-spinal fluid, living trypanosomes having been found there both as early as three days and as late as three and a half months afterwards.

Since we know that the cerebro-spinal fluid contains no complement or antibodies, and as it is not reached by drugs injected into the veins or given by the mouth, the trypanosome which finds refuge there must be attacked directly.

Attempts to do this by injections of various drugs have not proved satisfactory, but intrathecal injections of blood serum, containing, as we believe, the trypanolysins already formed in the blood, have given us good results.

As a point of interest in this connection, Dr. Abadie of Paris, who has been working on the treatment of syphilitic lesions of the brain, believes that the injection of serum into the spinal canal induces the further formation of complement, which normally does not exist there, and thus allows opsonic action to proceed where it would not otherwise occur.

What Vassallo and I have done has been to give an injection of neokharsivan into a vein, and later draw off a quantity of blood into a sterile covered vessel and allow it to clot, and then we have injected the clear serum into the spinal canal, after an equal quantity of cerebro-spinal fluid has been withdrawn by lumbar puncture.

In a few cases atoxyl was employed instead of neokharsivan, but the latter has been principally used in doses varying from 0.9 gm. to 0.3 gm. for an adult, the idea being slowly to destroy a large number of trypanosomes in the blood-stream and thus obtain the maximum amount of trypanolytic antibody formation.

The blood has been withdrawn from half an hour to four hours after the injection, and has been allowed to clot for from twelve to forty-eight hours before 8 c.c. to 25 c.c. of the clear serum have been injected into the spinal canal.

So far we believe the best technique to be 0.3 gm. of neokharsivan, with about 30 c.c. of blood drawn off after three hours and allowed to stand for twenty-four hours, and then 15 c.c. to 20 c.c. of the clear serum injected into the spinal canal.

Only one such injection appears to be required, and the patient is then allowed to go to his home, returning for re-examination from time to time as required.

No doubt in the future other drugs will be found in place of neokharsivan, and the whole technique

modified in many respects to the patient's advantage.

The intravenous injection has been given with an ordinary all-glass syringe, the drug being dissolved in 20-25 c.c. of freshly distilled water. The same syringe has been used to draw off the blood, a large bore needle moistened with citrate solution being employed.

The intrathecal injection was made through a lumbar puncture needle connected to the syringe by means of rubber tubing, but a special syringe is now being made for me by Messrs. Down Bros., which I hope will simplify this part of the operation.

SKETCH OF NEEDLE AND SYRINGE.



- A. Spinal needle
- B. 3-way tap
- C. Metal support
- D, D'. 20 c.c. syringes
- E. Metal rings to support syringes
- F. Stylette running through needle A.

Syringe D contains serum, while syringe D' is empty. C.S.F. is withdrawn into D' and the tap turned to allow equal quantity of serum to be run into spinal canal.

The immediate results of the injection into the spinal canal are severe, the patient usually having a sharp rise in temperature for a day or two, with an intense headache, but none of our cases have shown any more serious results.

I need hardly point out the necessity for the most absolute asepsis.

The results Vassallo and I have obtained so far by this method are most encouraging. The case of "Mr. X." I have already detailed, but he has only a comparatively short history, viz., twelve months since the probable date of infection and ten months since treatment.

Our first case was a woman treated by this method in September, 1918, and I heard from Vassallo in June last that he had just re-examined her again and found her absolutely well, thirty-two months after her single injection and with no other treatment of any kind.

Three men whom the progress of the disease had rendered impotent returned about a year after treatment and reported with great pleasure that they had become fathers, and they appeared quite satisfied that no outside help had been obtained to account for these happy events—at any rate they were no longer impotent.

One man treated in April, 1920, and aged about 60, cycled in thirty miles in one morning for re-examination, and informed Vassallo that for a year prior to treatment he had not been able to ride a bicycle at all.

On the other hand, one patient who received intravenous neokharsivan on August 3, 1920, but did not have intrathecal serum, made no improve-

ment, and living trypanosomes were found in his cerebro-spinal fluid at the end of October, when clinically he was rapidly going down hill.

We have treated in all some eighty patients by this method, but I only have full details of re-examinations up to December last, at which time there were thirty-one cases with a history of longer than six months since they had received their injections. Of these, two very advanced cases had not responded to treatment and had died, two had not reported for re-examination, and three had died from other causes, the other twenty-four had been subjected to constant re-examinations, and both microscopically and clinically were perfectly well.

Up to last December, of these twenty-four patients, eight had a history of over a year, and two a history of over two years since treatment.

The two advanced cases who did not respond to treatment are, as far as we know, our only treated cases who have subsequently died of sleeping sickness or even shown any signs of relapse.

There is, however, a patient upstairs who has been treated by this method by Dr. Manson Bahr, and who has shown no signs of improvement at all. This is of course very discouraging, but a possible explanation of the case offered by Professor Eyre is that as this patient had been previously treated by repeated doses of arsenic and antimony, this may have resulted in the formation of "fast" strains or alternatively have prevented or affected the formation of the trypanolysins, which we believe to be the curative factor.

Vassallo and I do not claim that we have found the perfect cure for trypanosomiasis, but we do believe we are on the right lines, and we do claim that our results are better than any others following one single medication.

We shall, however, be most grateful for any help you can give us in investigating and following up our methods, by the treatment of cases of sleeping sickness on the lines suggested, with any modifications of technique which may occur to you and with records of all possible details for future reference.

In conclusion, I must thank you very much for allowing me to take up your time this afternoon and for the patient hearing you have given me, and I only hope that any suggestions I have offered may prove useful to you in your treatment of trypanosomiasis in West Africa.

A SERIES OF CASES OF BILHARZIA DISEASE TREATED WITH TARTAR EMETIC.

By F. G. CAWSTON, M.D.Cantab.

The antimony treatment for bilharzia consists in the continuous administration of the drug, the patient being kept under its influence until all the parasites have succumbed, and the injections being given frequently enough to prevent the parasites from recovering from the last dose before the next is given.

The accompanying chart of twenty-five cases in which the bilharzia parasites would appear to have been entirely eradicated by tartar emetic confirms the opinion I have held for some time that 12 gr. is generally sufficient to effect a permanent cure, if the powder is dissolved in boiling water just before use, and the injections given at least three times a week for a complete month. However, a total of 20 gr. may be given without fear, provided no single dose exceeds 2 gr. even after the usual tolerance has been acquired.

Only those cases are included in this series¹ which (1) showed the presence of numerous spine-pointed ova in their urine before treatment, (2) in which the process of degeneration was watched by the microscopic examination of the centrifugalized deposit from the last ounce or two of urine passed by the patient throughout the course of treatment, (3) in which I had ample opportunity of satisfying myself that the results of treatment had been permanently successful. The three patients with the longest history of bilharzia infection each suffered from calculus.

Similar treatment proved successful in the treatment of a patient harbouring *Schistosoma japonicum*; but all the patients referred to in the chart contracted infection with *S. haematobium* from the rivers of Natal, the Cape, the Transvaal and German South-West Africa, and it may be that infestations with schistosomes in other parts of the world sometimes necessitate larger doses of tartar emetic.

Patient	Age	Years of disease	Tartar emetic	Urinary contents
H.C.	11	2	5 grs. in 21 days	No ova after 126 day
M.C.	13	2	9½ " 21 "	" " 126 "
B.A.	15	3	12½ " 21 "	" " 151 "
E.G.	22	3	12½ " 21 "	" " 45 "
				" " 90 "
W.L.	16	12	11 " 23 "	" " 89 "
				" " 229 "
D.C.	13	1	12½ " 25 "	" " 54 "
				" " 288 "
M.W.	45	12	18 " 26 "	" " 64 "
H.S.	20	10	20 " 27 "	" " 38 "
				" " 72 "
R.S.	20	3	16½ " 30 "	" " 41 "
				" " 73 "
				" " 104 "
J.C.	37	20	15 " 24 "	One black ovum after 67 "
				No ova after 101 "
				(vesical calculus)
C.S.	23	13	16½ " 24 "	One black ovum after 91 "
H.H.	36	12	13½ " 19 "	One black ovum after 92 "
W.R.	38?	15	14½ " 31 "	No ova after 106 "
				" " 160 "
				(passes calculi)
*L.D.	21	1	9½ " 21 "	No ova after 41 "
				(Negative antigen reaction after 61 days)
R.N.	13	5	10½ " 33 "	One black ovum after 263 days
W.C.	26	13	11 " 24 "	No ova after 111 "
M.M.	30	12	13½ " 32 "	No ova after 207 "
E.Y.	16	5	13½ " 25 "	Failed to cure
(Four months later)		20	38 "	No ova after 74 "
				" " 110 "

¹ Towards the expenses of this research a grant was made by the British Medical Association.

Patient	Years Age of disease	Tartar emetic	Urinary contents
T.R.	32 5	13 grs. in 32 days	No ova after 259 days (Colic occasionally)
T.G.	26 4½	12 „ 31 „	No ova after 300 „
*C.W.	12 1	13½ „ 34 „	No ova „ 117 „ Two black ova after 138 „ No ova after 221 „
*W.M.	29 7	12½ „ 25 „	No ova „ 80 „ „ „ 295 „
*O.S.	19 7	14 „ 30 „	No ova „ 86 „ „ „ 451 „
*A.S.	39 25	11 „ 20 „	No ova „ 127 „ „ „ 401 „ „ „ 498 „ (renal calculus)
A.W.	15 7	13 „ 38 „	No ova after 164 „

* See *Lancet* for August 21, 1920. for the earlier progress of these five cases.

THE CLIMATE AND HEALTH OF THE BRITISH SOLOMON ISLANDS.

By NATHANIEL CRICHTON, M.B., Ch.B. Glasgow.
Government Medical Officer, British Solomon Islands.

CLIMATE.

THE British Solomon Islands Protectorate extends in a north-westerly and south-easterly direction from Bougainville Straits to Mitre Island for a distance of nine hundred miles, and north and south from Lord Howe's Group to Rennell Island for a distance of four hundred and thirty miles.

It lies wholly within the tropics between the 155th and the 170th meridian of east longitude, and the 5th and the 12th parallels of south latitude.

The year can be roughly divided into two seasons, viz., the "south-east" and the "north-west." The seasons depend upon the prevailing winds, the "south-east" corresponding with the south-east trade wind and the "north-west" with the north-west monsoon.

The south-east trade wind extends from May to October, and practically blows continuously.

The north-west monsoon extends from December to March, and, unlike the south-east trades, does not blow continuously, sudden squalls accompanied by rain not being infrequent.

During the months of April and November there is a period of comparative calm.

The temperature at sea-level varies from a minimum night temperature of 70° F. to a maximum day temperature of 90° F. In some places even a lower night temperature than 70° F. is sometimes registered.

The rainfall varies considerably, even in places a few miles apart, but it is plentiful. There is more rain in the north-west season than in the south-east season.

The humidity and heat of the atmosphere have a very enervating effect upon Europeans.

HEALTH.

In consequence of the primitive condition of these islands, the lack of sanitation and the prevalence

of the anopheline mosquito, it cannot be said that the climate of the Protectorate is a healthy one for Europeans, and particularly so for women and children. It is, however, generally possible to avoid serious illness by taking necessary precautions and by the avoidance of all forms of excess. Exercise should be taken daily.

The health of a European in the tropics, especially in a new country, depends to a great extent upon diet, and for this reason an attempt should always be made to secure supplies of fresh foods, a regimen of tinned foodstuffs not being conducive to the best health. Unfortunately the latter in the past have been the staple articles of diet in the Protectorate. Fruits, fresh vegetables, eggs and poultry are now, however, becoming more plentiful, especially on plantations. Every householder should cultivate a plot of ground for the purpose of growing fresh vegetables, and should keep a small stock of poultry.

The humidity and heat of the atmosphere have a very enervating effect upon Europeans, who should in consequence take a change to a cooler and drier climate at not infrequent intervals.

The chief diseases against which Europeans have to contend are malaria and dysentery.

Malaria.—Malaria is widely prevalent throughout the group, and is the commonest ailment amongst Europeans.

The type present is the benign tertian one, though the malignant type and blackwater fever are also met with. In recent years blackwater fever has been the cause of several deaths amongst the white population.

The causation, prophylaxis and treatment of malaria are now well known, and it is possible by taking all necessary prophylactic measures to greatly minimize any serious danger from the disease. The anopheline mosquito being the carrier of the infection, it is obvious that a crusade should be made against this insect. Dwelling houses should not be built in the neighbourhood of swamps nor near houses inhabited by natives, who are invariably infected. Screen doors and windows should be used, or at least one mosquito-proof room provided, to which all Europeans should repair at sundown. The metallic gauze used should be a very fine one so as to exclude the anopheline mosquito, which is sometimes very small and slender. The surroundings of the house should be cleared of all shrubs, and pools and all collections of water drained or filled in.

Tanks should have all openings screened, and kerosene should at intervals be poured over the water. Empty tins and bottles, and in fact any receptacle capable of holding water, should be buried or thrown into the sea. While sleeping, a mosquito net of fine mesh should always be used.

The above measures will, if thoroughly carried out, cause the disappearance of most mosquitoes, but as it is practically impossible to avoid being bitten altogether, a daily dose of 4 gr. or 5 gr. of quinine (the sugar-coated tablets should not be used) should be taken directly after breakfast.

This is an excellent and generally effective measure.

All Europeans should expect, however, to sooner or later suffer from malaria, as but very few regular quinine-takers altogether escape the fever.

Quinine prophylaxis tends also to ward off black-water fever.

As all natives have malarial parasites in their blood, though they are themselves more or less immuned to the disease, they are a source of infection, and their houses abound with infected mosquitoes. Europeans should consequently avoid native quarters after sunset.

Dysentery.—Dysentery is the great scourge amongst the natives, and is responsible for most of the deaths amongst them. In past years epidemics of this disease have sadly reduced the native population.

Europeans not infrequently suffer from the disease.

The commonest cause of dysentery is pollution of the drinking water by the specific germ. Consequently, provided that precautions are taken against the drinking of doubtful water and good health maintained, the chances of contracting the disease is very small.

Other Diseases.—Pulmonary diseases and epidemics of influenzal colds occur in March and April, November and December, but it is possible to ward off these by taking precautions against chills. Yaws and ringworm are widely prevalent amongst the natives. The former is one of the main causes of the high infant mortality amongst them.

Tuberculosis, leprosy and venereal disease are also met with amongst the natives.

Tropical ulcers are found in Europeans as well as natives.

Such dangerous diseases as small-pox, cholera, plague, diphtheria, scarlet fever and typhoid fever are as yet unknown.

Pellagra Conference in Washington.—A conference was held in Washington on August 4 to discuss the pellagra question. The list of those present included Surg.-General Hugh S. Cumming and other officials of the Public Health Service, health officers of all the Southern States, with the exception of Georgia and Texas, and representatives of the Red Cross and Department of Agriculture. It was officially announced that the state of Mississippi presented 5,417 cases occurring from January to June, 1921, as against 2,763 for the same period in 1920.

The Australian Medical Inland Mission proposes to press the aeroplane into its service in the remote districts of Queensland and other parts of Australia where there are no railways. It is expected that in this way A.I.M. workers could work districts of 300 miles radius.

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THE JOURNAL OF

Tropical Medicine and Hygiene

OCTOBER 15, 1921.

BRITISH EMPIRE EXHIBITION (1923).

It has been resolved to hold an exhibition of Empire products during the summer months of 1923. Seventy years ago the 1851 Exhibition in Hyde Park was held, and the great building in which it was held now stands on the hill at Syden-

ham, a testimony to the capacity and ability of the British workman of that period, under the name of the Crystal Palace. The world was invited to see what steam had brought these islands to by the development of the railway-engine on sea and land; the application of steam power to machinery in factories; and to the fact that Britain led in every department of manufacture, and had become the workshop for the world. To-day it is intended to invite the representatives of all the nations to again assemble to see the meaning of the British Empire on a scale which promises to far outdo anything the world has yet seen, and to demonstrate what the off-shoots from this small island in the North Sea have grown into. With H.M. King George V as Patron; the Prince of Wales, most capable of Britain's sons, as President of the General Committee; Lord Morris, a Newfoundland statesman of high repute, as Chairman of the Executive; and a list of men as Vice-Presidents and members of the Executive Committee representing every branch of science and art in the Empire.

Why this Exhibition concerns us is because the President of the Royal Society of Tropical Medicine and Hygiene has been invited to join the General Committee, and was invited to attend the public meeting at the Mansion House on October 12, 1921.

On October 14, 1921, at the Executive meeting of the Royal Society of Tropical Medicine, the President stated the call made upon the Society, and asked that a small preliminary committee be formed to deal with the matter of how tropical medicine shall be represented at the Exhibition, and that a General and Executive Committee be formed to adequately represent the important claims of the Empire in the field of tropical medicine to a high place in this field of science.

Amongst the objects of the Exhibition duly set forth in the Handbook of the Committee, the third out of the four objects of the Exhibition is science.

"These committees will arrange displays calculated to arouse public interest in all efforts to conquer disease and unhealthy conditions of existence. Housing and sanitation will be given especial prominence. All that is being done in these directions by the British peoples will be illustrated, and valuable support will be given to the campaign against the diseases of men, and of animals, which prevent large parts of the Empire from being colonized, and keep other parts unhealthy. Thus a far-reaching attempt to better the conditions under which man lives, and to check all influences hostile to his well-being, will be set on foot.

"At the Ghent International Exhibition in 1913, a small department in the British Section was devoted to illustrating the causes and the life-history of some of the more dangerous tropical diseases, together with the methods employed to combat them. It is intended to develop this idea upon a large scale, and to extend it to plant-diseases which hinder agriculture. Work of in-

calculable worth can be done by turning public attention throughout the Empire to these problems, and by encouraging scientists and administrators in all the Dominions, Colonies, and Dependencies to attack them upon common lines."

It will be seen that tropical diseases, both of man, of plants and of animals, are to form a large and important part of the 1923 Exhibition work, and that hygiene, housing and sanitation will be given especial prominence.

Thanks to the work of British medical men in tropical medicine during the past twenty years, Britain holds a foremost place in every branch, whether investigation, research, practical medicine, hygiene, preventive medicine, or sanitation, and it is to be hoped that an exhibit worthy of the high position Britain holds in this branch of science will be promoted and attained. The arts in the 1851 exhibition held full sway; tropical medicine and all the branches of the sciences it involves were unborn; the microscope was practically unknown; modern pathology was not founded until twenty years later, and humoral pathology held sway; physiology was in its infancy; chloroform had just been introduced (1847); Listerism in surgery came in a quarter of a century later; and Manson was but a boy. Our streets were lit by oil lamps, and the cry of the watchman announced the hours of the night.

The idea of an Empire Exhibition was formulated by that great Imperialist, Lord Strathcona, in 1913, but the Great War prevented its development, and it was not until 1919 that the matter was again taken up. A great stimulus to the promotion of the idea was the state of the country, owing to strikes promoted by the labour union leaders bringing politics in the arena of societies of men unfitted for such teaching. The good that appertained to the societies when first conceived was corrupted. The "ea' cannie" teaching spread as a plague, the spirit of the workmen that produced the 1851 Exhibition was infected as by a sepsis, and produced a putrid thing that no longer helped the mechanics of Europe, but gave us societies styled by Carlyle as "Sluggards and Scoundrels Protection Societies," and judging by the fruits of their labours, the name by which they will be known in history when mankind returns to mental stability and follows the laws of God and Nature in place of the devil's teaching. The Exhibition is being pushed forwards in order to do something to give the workmen employment, a most humanitarian reason, and if it creates a thankfulness amongst the class that it is being arranged for it will be a blessing.

A Guarantee Fund is on foot, and the following note has been issued:—

"In view of the Prince of Wales's very earnest appeal to complete the Guarantee Fund for the British Empire Exhibition before the 26th inst. (when he leaves for India), I venture to suggest that next week (i.e., October 17-22) should be regarded as the British Empire Exhibition week, and that every member of the General Committee

should interest himself personally in securing at all events a few guarantees. It may be pointed out that the signing of a guarantee form involves no immediate payment of cash, that our estimates make it highly unlikely that any call will be made upon guarantors at all, and that even if, at the close of the Exhibition accounts, an inconsiderable percentage of the amounts guaranteed should be called up, the contingent interest of every guarantor in the subsequent development of Wembley Park makes a complete reimbursement of any such call a practical certainty."

How far medical men are called upon to help forward this appeal is for each man to decide for himself; and no doubt a lead will be taken by the Universities and Colleges of Physicians and Surgeons. It is impossible to have a guarantee got together by the members of the Royal Society of Tropical Medicine and Hygiene in time to declare their mite towards this great object, for the members are largely overseas members, and the members in the various Dominions and Overseas Colonies and Protectorates will be giving their names towards the local guarantee called for.

Provided the workmen are imbued with the spirit of "Britannia Rediviva," there will be no fear of strikes and a real programme thwarting the progress and completion that is intended for their immediate good and the resuscitation of the various communities and nations of the Empire.

All communication to be addressed to the General Manager,

W. F. WINTOUR, C.B., C.M.G.,
16, Hobart Place,
London, S.W.1.

"The Prince of Wales is very anxious to know the practical results of his Mansion House appeal before he leaves for India, and has asked that a complete list of guarantees secured during the next fortnight should be sent to him on Tuesday the 25th. If each of those to whom this letter is being sent set himself out to secure £500 in guarantees next week, the minimum of one million sterling would be passed, and work could actually start at Wembley on the day the Prince leaves Portsmouth. To some, the task of giving or procuring guarantees to an aggregate of £500 is a very light one, to others it may be impossible, but there is no one who cannot help to some degree, however small. It would be a very fine tribute to the Prince's lead if I were in a position to tell him on the 25th inst. that every member of the General Committee who heard or read his speech had taken a share in doing what he asks."—W. F. WINTOUR.

Any information on this subject desired by members of the medical profession placed on the local committees throughout the Empire will be dealt with by this journal if requested to do so. As isolate medical men, asked to advise the Governors of the districts they are located in, may be at a loss to know what other men similarly situated to themselves are doing.

THE PUBLIC PRESS AND YELLOW FEVER.

THE ROCKEFELLER FOUNDATION INTERNATIONAL
HEALTH BOARD,

61, BROADWAY, NEW YORK.

July 18, 1921.

WE have read the editorial in the JOURNAL OF TROPICAL MEDICINE AND HYGIENE for May 2, 1921, entitled "Comments arising from Recent Statements in the Public Press upon Yellow Fever: its Causes and Treatment." Inasmuch as the journal appears to have been labouring under a misapprehension as to the prevalence of yellow fever, perhaps you would welcome our calling your attention to a recent article by General Gorgas, Dr. Carter and Dr. Lyster, which gives a historical review of the distribution and efforts to control yellow fever. A reprint is enclosed.

So far as we are aware, no responsible authority ever asserted that yellow fever has been eliminated. We do remember having seen a popular newspaper article which quoted General Gorgas as making the announcement that yellow fever had been wiped out. Obviously General Gorgas could never have made any such announcement. He was not a man who made unconsidered statements of that kind. As a matter of fact, when General Gorgas died, he was in London on his way to West Africa as the head of a commission to investigate yellow fever in West Africa, and at that time he had plans under way to combat the disease in Central America, and as soon as feasible in Mexico.

General Gorgas and his colleagues did eradicate yellow fever from Havana and Panama. Oswaldo Cruz brought it under control in Rio de Janeiro. Thomas and others eliminated the infection from the Amazon Valley. Dr. M. E. Connor exterminated the disease from Ecuador. All these regions are still free. But Brazil has never been free from the infection. There has probably not been a time within the last half century when it did not exist in Mexico. It has appeared repeatedly in recent years in various parts of South America and the West Indies. The infection now exists on the east coast of Brazil, from Pernambuco to Bahia; in Peru; and in Mexico. During the year 1920 epidemics occurred in many places in Central America—Guatemala, Salvador, Honduras and Nicaragua.

As to the situation in West Africa there is difference of opinion. There is much evidence, however, to indicate that yellow fever has appeared in recent years over a vast region extending from Senegal on the north to the Belgian Congo.

I am sending you under separate cover copy of the Annual Report of the International Health Board for 1919, which gives a brief summary of yellow fever conditions. The annual Report for 1920 contains a more recent summary of the situation. As soon as this report comes from the printers we shall be glad to send you a copy.

As to the Noguchi vaccine, we may say that Noguchi regards it as still in the experimental stage.

It has been tested pretty thoroughly on guinea-pigs, and has had rather extensive tests on human beings in Mexico and Central America. All these tests have given encouraging results. We should like to say, however, with emphasis, that the vaccine, while probably offering protection to the individual, should not be regarded as a substitute for mosquito control in the extermination of infection or in guarding a community against the introduction of infection. The fight against yellow fever is, in the last analysis, an attack upon the breeding places of the *stegomyia* mosquito. It would be unfortunate if health authorities should come to rely upon the vaccine as a substitute.

Very sincerely yours,
WICKLIFFE ROSE.

[We are deeply indebted to Mr. Wickliffe Rose for his remarks and heartily agree with him. Unfortunately, the reprint referred to was omitted to be enclosed, but we are fairly well acquainted with the publications on the matter. Our article was merely dealing with statements in the public press, not the scientific publications.]

Annotations.

Some Points concerning Trachoma (Lt.-Col. H. Kirkpatrick, I.M.S., *Transactions of the Royal Society of Tropical Medicine and Hygiene*, vol. xv, Nos. 1 and 2, 1921).—The author lays stress upon the following points: (1) Trachoma causes blindness and loss of efficiency. (2) It is associated with bad housing conditions, dirt, and general insanitary surroundings. (3) When the resistance of the conjunctiva to infection is lowered by dust and glare the spread of trachoma is highly increased.

The Comparative Toxicity of Thymol and Carvacrol (Isothymol) (A. E. Livingston, *Public Health Reports*, vol. xxxvi, No. 23. America, June, 1921).—The author comes to the following conclusions:—

(1) The toxicity of thymol and of carvacrol on rabbits is essentially the same.

(2) The toxicity of thymol and carvacrol as tests on paramecia shows no striking difference.

(3) Tests on earthworms indicate that the relative anthelmintic value of thymol and carvacrol is practically the same.

Kala-azar in Northern China (J. H. Wylie, *China Medical Journal*, November, 1920).—The author describes thirty-five cases of kala-azar in China. All the patients were males between the ages of 4 and 30; there were thirteen cases under 10 years of age, fifteen of 11-20, and seven of 21-30. In fifteen cases puncture of the spleen confirmed the diagnosis. The symptoms of the disease are similar

to those in other countries. Of the thirty-five cases, ten died, nine have been lost sight of, and the other sixteen are still alive. In seven cases splenectomy was performed, with the result that two were cured, two relapsed, and three died. One died soon after leaving the hospital from pulmonary tuberculosis. The cases remaining in hospital were treated with tartar emetic, some of them improving. The author is of the opinion that if the tartar emetic treatment had been started sooner and more thoroughly there might have been better results.

Some Suggestions concerning the Bacteriological Diagnosis of Human Botulism (K. F. Meyer and J. C. Geiger, *Public Health Reports*, vol. xxxvi, No. 23. America, June, 1921).—*Bacillus Botulinus*, type B, has been isolated from the jejunal wall of a case of botulism fatal on the fifth day of the disease. Spleen cultures in two instances were negative for *B. botulinus*. Stool specimens of two clinical cases of botulism, obtained from two different outbreaks, contained *B. botulinus*, type A, on the sixth, seventh, and eleventh day respectively, after the consumption of the causative meal. The methods of tissue and stool cultures are described.

Abstracts and Reprints.

THE ASTHMA PROBLEM.¹

By ALBERT VANDER VEER, JR., M.D.

From the Department of Medicine and Bacteriology of Cornell University and the Clinic of Applied Immunology, New York Hospital.

FOR many years the problem of asthma has been one of the most difficult in medicine. In fact, it is only within the last decade that any marked advance in its solution has taken place. Until this late date the usual attitude towards the asthmatic patient was summed up in the oft-quoted remark, "Of course it's a very distressing disease, but no one ever dies from asthma." Cold comfort this for the poor suffering patient who might go from doctor to doctor, from allopathy to homœopathy, to osteopath and chiropractor, always in pursuit of that mythical "friend of a friend of mine who was cured by —," to be met in the end by the remark quoted above. No wonder he finally gave up trying and accepted his fate with what resignation he could, branded as a neuropath by those of us who could do nothing for him, and bearing with his physical ills the half-contemptuous pity of those splendid, healthy, normal individuals who were not neurasthenic and had no asthma; and yet at times a ray of hope broke through his cloud of despair. An occasional authenticated case of cure or relief

¹ Abstracted from the *New York Medical Journal*, September 18, 1920.

come to his attention. Some asthmatic moves from Maine to Arizona and is free—or else moves from Arizona to Maine. He gives up farming to become a banker, or carries a lucky penny in his pocket, and our patient tries the same scheme with renewed hope, but it doesn't work for him, and another fond hope is blasted.

I well remember in my medical school days at the College of Physicians and Surgeons, Dr. James, Professor of Medicine, telling us of a colony of asthmatics who could live only around Second Avenue and Thirteenth Street, New York. As soon as they came above Forty-second Street they had an attack. Many tales as strange as this are current, and they explain our readiness to dub the asthmatic as a neuropath, and our insistency that if he would only get hold of his nerves and make a man of himself he would cease to suffer. With our more recent knowledge, how easy it is to explain some of these apparent inconsistencies.

It is time something was done to help these sufferers. There is probably not one of us who has not, at some time, sat near a patient suffering from an acute attack of asthma, suffering with him in his distress and feeling powerless to help, or, worse yet, able to help and not daring to. We all know that the injection of a small dose of morphine will ease the laboured breathing and bring comfort to the patient—for a time. We also know that these attacks will come again and again, and that the morphine injection will bring less and less relief with a larger and larger dose, until finally we have two evils to fight where before there was but one.

The first real step of progress was made when Meltzer brought forth the hypothesis that asthma was an anaphylactic phenomenon. This was in 1910, and succeeding steps have come rapidly, until now it is rare to read a medical magazine which does not contain at least one article on asthma or hypersensitiveness.

In 1911 Freeman and Noon, in England, published a short article on the treatment of hay fever by injections of pollen extract, which was apparently the first step in the scientific treatment of hypersensitiveness. Their work was soon followed by similar experiments in the United States. Much of the pioneer work in this line in America has been done by Dr. R. A. Cooke, of New York, with whom I have been associated for ten years, and most of the statistics on which this paper is based have been drawn from his case records.

Starting with the asthma associated with hay fever, the work has been a steady assault on the asthmas due to hypersensitiveness to other substances, until now I think it fair to estimate that about 70 per cent. of all asthmas (of course in this paper I exclude the so-called cardiac and renal asthmas) may be diagnosed by careful work, and in this disease the diagnosis, as a rule, is more than half the battle.

DEFINITION AND CLASSIFICATION.

The following definition and classification of asthma, with postulates which must be fulfilled

before one may assume the allergic condition of an individual to any substance, are taken from the article on bronchial asthma by Cooke in Tyson's "System of Medicine."

Definition.—Bronchial asthma is a condition characterized by dyspnoea, both inspiratory and expiratory, especially the latter, due to bronchial spasm and œdema of the bronchial mucous membrane. It may be acute, subacute, or chronic. The term bronchial asthma should be restricted to that condition which is the result of an allergic reaction.

Classification.

1. Allergic (a) by inhalation	{ Animal dander Pollens Sachets and perfumes
(b) by ingestion	{ Drugs Foods
(c) by absorption from focus	{ Bacterial proteins
(d) by subcutaneous or intravenous injection	{ Therapeutic sera
2. Non-allergic	{ Acute bronchitis Chronic bronchitis and emphysema Pulmonary tuberculosis Cardiorenal disease Thymic enlargement Enlarged bronchial glands Reflex bronchial spasm.

The relative size of the groups under this classification may be judged from the following figures: I had hoped to have a large group of cases covering the work done in 1917, 1918 and 1919, but owing to the short notice on which this paper was written I am only able to give the figures for 1917, a total of 143 cases. Of these, eight were seen but once or twice, and are rejected as giving insufficient data for a diagnosis. The 135 remaining cases were divided as follows: Pollen, 52, or 38.5 per cent.; mixed, 19, or 14 per cent.; animal, 12, or 9 per cent.; bacterial, 11, or 8 per cent.; food, 2, or 1.5 per cent.; undiagnosed, 39, or 29 per cent.

A word in regard to this classification. A large number of patients will give skin reactions to two or more substances in different groups, for instance to a pollen, several foods, and possibly some animal dander, and yet the only complaint may be asthma occurring with hay fever in September. This is therefore classed as a pollen asthma and not mixed, although giving skin reactions for other substances. The patient is said to be potentially allergic to the other substances, but for some reason they do not come in sufficiently close contact with the bronchial mucous membrane to set up a reaction. At any time, however, clinical symptoms may result from such substances, and the patient should be warned of that fact when the diagnosis is made.

The two postulates, formulated by Cooke, that must be fulfilled before we may assume that any substance is etiologically important in a case of hypersensitiveness are as follows:—

(1) Hypersensitiveness must be demonstrated either by (a) a positive local reaction, cutaneous or

ophthalmic, or (b) the original allergic manifestation must be artificially reproduced at will on introduction of the substance, either inhaled, ingested, or subcutaneously injected.

(2) It must be shown that the individual comes in contact in some way with the suspected substance in order to permit it to act as an ætiological factor.

TREATMENT.

The first thing is treatment of the immediate attack. Here our chief reliance must be placed on epinephrine used hypodermically. From 5 to 15 minims of this drug repeated every half an hour or so will control the great majority of asthmatic attacks, the relief lasting from a few hours to a day or more. I think this drug is too sparingly used, because of the impression that it raises blood-pressure and eventually causes chronic hypertension. This is not true, and you may easily prove to your satisfaction that epinephrine, administered during an attack of asthma, actually lowers the blood-pressure from ten to thirty or more points by relieving the bronchial spasm. I have seen patients who have taken epinephrine for many years in considerable doses and who do not exhibit hypertension or any ill-effects from it; nor, as a rule, do they have to increase the dose. Incidentally I may mention that it is of equally great value in other manifestations of hypersensitiveness, such as urticaria, angioneurotic edema, and those rare cases of shock following the ingestion of food or drugs to which a patient may be allergic. It is one of the few drugs which can be depended on to work and should be in every practitioner's armamentarium.

Morphine has been used for the acute attacks. Personally, I have a great dread of it in such a chronic condition as asthma. It will, of course, relieve the immediate condition as well as epinephrine, but the danger of forming a habit is too great, and it should be used only in the cases of most urgent need. For milder attacks there are a number of pastilles, powders and cigarettes on the market, most of them with a base of stramonium leaves, which are very valuable, and should be used to give the patient relief. Atropine may be given in doses of 1/200 to 1/75 of a grain as indicated. It can be given by mouth or hypodermically, and is a valuable aid. Benzyl benzoate in doses of 20 to 30 minims four times a day has lately been highly recommended. What little experience I have had with it has been most disappointing, but in view of the good reports from other observers, I think it is worthy of a thorough trial.

The treatment of the underlying condition, of course, depends on the history and results of the examinations and tests. Where the exciting cause can be eliminated from intimate contact with the patient this should be done. Where this cannot be done the patient should be immunized against the exciting cause. To illustrate: Where the patient

is hypersensitive to one or more articles of food, these should be eliminated from his diet. It often happens that after abstaining for a time he is again able to eat such foods in moderation without trouble. This is particularly true with children who are hypersensitive to egg or milk proteins. We have records of a number of such cases, hypersensitive in early childhood, but now able to eat milk and eggs in adult life without any trouble. This is in marked contrast to hypersensitiveness to animals and pollens, which is very likely to continue during the life of the patient.

In the case of the boy hypersensitive to rabbit hair the treatment was simply to remove the pillows stuffed with such hair and to warn him of his enemy for the future. In cases of cat and dog hypersensitiveness, it is easy to immunize against the dander, but as the treatment must be continued indefinitely it is wiser to remove the offending animal. It is not sufficient to stay away from the cat or dog—it must be entirely removed from the house, and then all the rooms must be carefully cleansed several times to get rid of the dander scattered about.

In pollen hypersensitiveness it is ordinarily impossible for the average person to avoid exposure during certain times in the year. For the leisure class there is always the opportunity and excuse of a trip to Europe, where they may escape the late hay fever and asthma, but the grass pollen cases are as much exposed in Europe as they are in this country. We must here make use of active immunization and, fortunately, the results are excellent, better in fact than the results of the treatment of the hay fever with which the asthma is associated. Cooke reports a series of 135 cases of hay fever and asthma treated by pollen injections with the following results:—

Asthma not improved	...	...	5 per cent.
Asthma slightly improved	...	...	6 "
Asthma improved	...	...	36 "
Asthma absent	...	...	53 "
Hay fever not improved	...	...	4 "
Hay fever slightly improved	...	...	5 "
Hay fever improved	...	...	85 "
Hay fever absent	...	...	6 "

In other words, the asthma was entirely controlled in over half the cases, while in 36 per cent. more a fairly satisfactory result was obtained.

The principle of the treatment is the injection of gradually increasing doses of pollen extract at intervals from five to seven days. Such extracts are now obtainable from any commercial drug houses. The only disadvantage in their use is that the dose is graduated to the more sensitive cases in order to avoid constitutional reactions, and hence the doses are too small to immunize completely the less sensitive persons. The results, however, are surprisingly good. In the series quoted above the extract was standardized according to the amount of nitrogen contained, and this enables one to graduate the doses very exactly. All patients were tested out by eye and skin tests and their degree of

sensitiveness thus determined. It takes about fifteen to twenty injections all told, and the treatment should be begun, if possible, six weeks before the season. If the patient is not seen before the hay fever and asthma have actually started, then he is treated phylactically instead of prophylactically. Several small doses are given on succeeding days, then at intervals of two, three, and four days until the end of the season. The results in cases so treated are almost as good as those treated before the season begins. By these pollen injections the asthma is not only relieved, but the patients are, as a rule, protected against secondary infections at the end of the season, which very often prolong the asthma and cough until long after the pollen factor has disappeared, and also renders them much less susceptible to attacks of asthma and bronchitis during the winter months.

I wish to emphasize again the importance of bearing in mind the value of epinephrine in this treatment. We endeavour to give as large doses as possible of the pollen extract without causing a general or very marked local reaction. Occasionally the patient receives a larger dose than he can stand, and within a few minutes general urticaria, asthma, or hay fever develops. These reactions can be readily controlled by one or more doses of the epinephrine, and are no more than a passing inconvenience. The patient should be warned of this and reassured. If such reaction occurs unexpectedly and is not treated, the patient is needlessly alarmed and often refuses to continue a treatment which seems to him dangerous.

In patients hypersensitive to animals it is usually possible to avoid exposure, and thus there is no necessity for active immunization. In the few cases where it seems best to immunize it is fortunately easy to do so. These are usually horse epithelium victims. The first doses should be extremely small, but after about ten injections the patient is almost always able to come in the closest contact with horses without experiencing discomfort. Injections may now be given at monthly intervals, or may be discontinued entirely if the patient is constantly exposed to horses, and thus keeps up his own immunity.

Hypersensitiveness to sachets is best treated by avoidance of such sachets if the patient is only moderately hypersensitive. This will give freedom, except on rare occasions, when brought into contact with unusually severe exposure. In some cases it may be necessary to immunize with doses of sachet extract, and the results are, as a rule, very good.

Patients exhibiting an allergic reaction to drugs are extremely interesting. Quinine and aspirin are the two most frequently met with. The reaction is not like an overdose of the drug in a normal person, but a typical allergic one—asthma, urticaria, or even extreme shock may occur after a very small dose. It is well to bear in mind there are such persons, who usually say they have an idiosyncrasy to such and such a drug, for we have records of at least two dozen aspirin cases, in one of which there developed an attack of asthma lasting three weeks

following the ingestion of 5 gr., and another patient who immediately went into shock, and died in five minutes from the same amount. It is probable that some cases of unexplained sudden death are due to a hitherto unknown allergy to one of these commonly used drugs. The treatment is the avoidance of the offending drug, and great care on the part of the patient that he never receives a dose of it by mistake.

Many cases of chronic asthma are complicated by an accompanying chronic bronchitis. Some of these will clear up when the underlying cause of the asthma is removed, but many of them will require treatment for the bronchitis as well as the asthma. Here it is well to have an autogenous vaccine made from organisms recovered from the washed sputum (this must be done by a competent bacteriologist to get any satisfactory results), and these must be properly interpreted, and the injections of this vaccine should be given over a long period of time. The maximum dose should be at least three to six billion, and the injections should be continued for some time after the organism has disappeared from the sputum.

Local treatment for all foci of infection is, of course, essential. Polypi should be removed, sinuses drained, diseased tonsils thoroughly removed, and teeth radiographed and treated. Every effort should be made to place the patient in as normal physical condition as possible.

You will frequently be asked whether a change in climate is advisable, and if you are honest with your patient and yourself the answer is usually "No." I admit that the temptation is strong, when you have been dealing with a particularly obstinate case, to shift the responsibility to some other doctor living in California, or Texas, or Colorado, but the chances are that the patient will there encounter the same pollen, pillows, food, sachet, or animals which he encounters at home, and if a change is made it is often just as efficacious to move next door or across the street and much cheaper. Be conscientious and persevere until you have solved the problem yourself. An exception to this rule can be made in a few cases, complicated by tuberculosis or run down by long suffering or a chronic bronchitis, who occasionally need a change in climate to build up their general health.

PROGNOSIS.

This has been touched on under treatment. The prognosis depends on the diagnosis. At the present time about 70 per cent. of all cases can be diagnosed. Over one-third of these are pollen asthmas, and the figures already quoted show that 90 per cent. of these patients can be made quite comfortable. Of the animal and food asthmas the great majority can be entirely removed. The really difficult cases are those with a complicating infection sinus, bronchial or intestinal. The larger proportion can be relieved by appropriate treatment, but they require long and careful investigation, with a maximum of patience and perseverance on the part of both doctor and patient. As to the

undiagnosed 30 per cent.—this class is steadily becoming smaller, and I am sure will continue to decrease. Each difficult case solved is an advance. It took two months of hard work to solve the problem of the lad who was sensitive to rabbit hair, but when it was achieved three more difficult cases were found to be similar, and all were relieved immediately.

The word relieved is here used intentionally, for it cannot be said that these patients are cured any more than a diabetic is cured who keeps within his sugar tolerance and is symptomless and sugar-free. They are still sensitive to their particular substance, and as far as we know they will continue to be so indefinitely. A few rare cases show complete cure, some spontaneous, and some as the result of treatment, but they are the exception, and we do not know the reason for their recovery. However, you will find that patients care very little whether you use the word cure or relieve. If they do not have asthma they are, as a rule, satisfied.

Current Literature.

INDIAN MEDICAL GAZETTE. Vol. LVI, No. 8, August, 1921.

Glaucoma and Epidemic Dropsy (Lt.-Col. F. P. Maynard, F.R.C.S.).—In several cases of glaucoma treated by the author of the various treatments tried, trephining was found to give the most satisfactory results. Miotics relieved temporarily, as did leeching the temples. Purging did harm. Many of the patients were anæmic and easily got diarrhoea. Hemorrhage into the anterior chamber at and after operation was frequent. It was found that operation on one eye seemed in some cases to have a bad effect on the other eye for a time.

The Value of Sodium Morrhuate and Sodium Linate in Tuberculosis and Leprosy (C. Davies, M.B.).—The author has used sodium morrhuate and sodium linate in cases of tuberculosis with very satisfactory results, but suggests that the composition of these preparations as used at present is not constant, which accounts for the divergence of opinion amongst practitioners regarding them. A specific reaction, focal or general, is not always apparent, but in some cases appears to be very definite. Two cases of apparently hopeless pulmonary tuberculosis are reported to be cured by sodium morrhuate, also three cases of lupus.

Notes on Filariasis, Elephantiasis and Allied Conditions (S. Sundar Rao, I.M.P.).—The term "Filariasis" is applied in its widest sense to the presence of micro-filariae in the blood of man as well as the diseases associated with it. In the strictest sense of the term it is confined to the occurrence of the micro-filariae in the blood—the associated pathological conditions being secondary. The micro-filariae occurring in India and in Fiji are said to be identical, as far as the minute anatomy is con-

cerned. They seem to differ to some extent as regards their life-habits. This difference appears to be connected with the geographical distribution and the intermediary hosts. It is a settled fact that *Culex fatigans* and *Stegomyia pseudo-scutellaris* are two efficient intermediary hosts in transmitting the disease in India and in Fiji, respectively. The development of *F. bancrofti* in man, after leaving the mosquito, and the duration of its life in man, are not yet known. The periodicity observed in micro-filariae in India is connected with sleep and its attendant phenomena. For the production of the elephantoid condition either repeated infestations of filaria or a primary infection of filaria together with a secondary invasion by micro-organisms are essential.

Blackwater Fever in Khondmals, Orissa (K. Daleppa, I.M.P.).—The author describes a case of blackwater fever which ended fatally owing to the fact that the patient refused to take nourishment, also anuria and bleeding from the bowels set in. In other cases treated successfully all the patients were malarial subjects; after remaining two or three years in the malarious district they developed symptoms of blackwater fever. Rapid enlargement of the spleen occurred, there was congestion of the liver, high fever with pain in one or both kidneys, and sometimes hæmoglobinuria. Symptoms of dysentery were also present in three cases.

Review.

BARRIER CHARTS FOR HEALTH OFFICERS. A SYNOPSIS OF PREVENTIVE MEASURES AGAINST COMMUNICABLE DISEASES IN FOUR TABLES. By S. H. Daukes, O.B.E., M.B., D.P.H. London: Baillière, Tindall and Cox. Price 3s. 6d. net.

Dr. Daukes has succeeded in compressing the chief facts concerning the control of communicable diseases into four charts, giving a birds'-eye view respectively of the alimentary, respiratory, inoculation and contact groups of diseases. These charts he terms Barrier Charts, since sanitation is the barrier which a civilized community places between the sick person or germ carrier and the healthy population. Although each portion must be simultaneously included in the scheme of defence, Dr. Daukes divides this barrier into four parts, the first dealing with the sick person and contacts, the second being zoological (animals, insects, shell-fish, &c.), the third being dependent upon general hygiene applied to the healthy person, whilst the fourth deals with immunization by vaccines, sera, drugs, &c. These charts should hang on the study wall of every student of public health and every practitioner of tropical medicine, and on the office wall of every medical officer of health and port sanitary officer for constant study and reference. They cannot fail to be of great value both from an educational and administrative standpoint.

Original Communications.

NOTES ON A CASE OF TUBERCULAR LEPROSY TREATED BY INTRAVENOUS INJECTIONS OF STIBENYL.

By R. G. ARCHIBALD, D.S.O., M.D., Major, R.A.M.C. (Retd.)
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SOME twelve months ago the writer had an opportunity of treating an early case of tubercular or nodular leprosy by intravenous injections of colloidal antimony. The case was that of a better class merchant who was suffering from lepromata of the face and hands. After a total of ten intravenous injections of colloidal antimony sulphide (1.5 gr.) the lesions had almost disappeared, and the few lepra bacilli present showed evidence of marked degeneration. Unfortunately, the patient left the Sudan before the treatment was completed, and it has not been possible to trace his further history.

The case, which forms the subject of this paper, was that of a Sudanese, about the age of 40, who had suffered from nodular leprosy for some four or five years. On examination, the whole of the tissues of the forehead and face showed a dense nodular infiltration which had extended also to the eyelids; this infiltration representing lepromatous tissue was also well marked in the vicinity of the mouth and chin; indeed, the whole face represented the characteristic leonine countenance of nodular leprosy. Lepromatous nodules were also present in the larynx, thus accounting for the patient's raucous voice; one nodule was also present on the dorsum of the tongue, and ulceration of the nasal mucosa was also noted. On the trunk, both anteriorly and posteriorly, numerous prominent lepromata were present (figs. 1 and 2). The general condition of the patient could only be described as fair; physically, he was incapable of doing much work; mentally, he appeared somewhat dull and apathetic.

Examination of the urine showed a slight degree of albuminuria but no casts. Smear preparations from the nodules and the nasal mucosa showed lepra bacilli, thus confirming the clinical diagnosis.

In view of the good results obtained by the use of antimony in the previous case, the writer considered that stibenyl, the sodium salt of *p*-acetylaminophenylstibinic acid, might be given a trial.

The drug was dissolved in sufficient sterile normal solution or water to produce a 1 per cent. solution, and this was given intravenously on alternate days, the dosage employed being 0.1 grm., 0.15 grm., 0.2 grm., 0.4 grm., 0.5 grm., and 0.6 grm. At the end of this course the patient was given a rest from treatment for fourteen days, and a similar course of therapy repeated.

On the completion of the first course there was slight improvement in the patient's condition, the

lepromata were softer, less prominent, and in several areas had shown superficial ulceration.

After the fourth course of treatment, when a total of 7.8 grm. of the drug had been administered, the patient showed considerable improvement (figs. 3 and 4), which he was not slow in appreciating. The lepromata on the trunk, both anteriorly and posteriorly, had practically disappeared and were no longer prominent to the eye, and indeed, were almost level with the unaffected skin. A great improvement was also noted in the face, which no longer presented a leonine appearance, and the furrows separating the lepromata were not so prominent, and here also many of the nodules had subsided.

The nasal ulceration had almost healed, and the patient's voice was no longer hoarse and raucous. Smears from the nasal mucosa and from the nodules showed what appeared to be degenerated coccoid forms of lepra bacilli lying free and intracellularly, the few bacillary forms present being very granular.

REMARKS.

The writer has been tempted to publish these notes in the hope that this salt of antimony may be given a more extensive trial, more especially in early cases of leprosy. The result obtained in the case recorded has certainly surpassed any effected in this country by the use of sodium gynocardate, and better results may still be achieved if a more intensive treatment with stibenyl be employed.

Other than a slight degree of nausea and diarrhoea following the injections, the patient had no ill-effects from the drug, and the slight degree of albuminuria did not appear to be a contra-indication to its use.

Apart from the marked clinical improvement in the case, the drug appeared to exert an effect on the groups of lepra bacilli seen in smear preparations; in the smears taken prior to treatment, the bacillary forms of the organism were predominant; after treatment, most of these had been replaced by coccoid forms, and the few bacillary forms had lost their homogeneous characters and were headed in appearance.

Too much stress, however, should not be placed on these changes in view of De Mello's and De Souza's [1] observations on the various morphological types of the specific bacilli met with in leprosy lesions. Still it appears not unreasonable to attribute the changes noted in this case to the specific action of the drug.

Cawston [2] has also recorded the therapeutic value of antimony salts in a few cases of leprosy and their further trial appears justifiable.

ACKNOWLEDGMENTS.

I am indebted to Dr. Grantham Hill for kindly placing the case at my disposal, and to Dr. Atiyeh and Dr. Haddad for kindly administering the drug.

Khartoum,

September 11, 1921.

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ILLUSTRATIONS.

- FIGS. 1 and 2. Case before treatment with stibenyl.
FIG. 3. After treatment with 1.9 grm. of stibenyl.
FIG. 4. After treatment with 7.8 grm. of stibenyl.

THE CHANGE IN THE LEUCOCYTIC BLOOD-PICTURE AS A SYMPTOM OF MALARIA.

By Dr. W. A. KOP.

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PROBABLY the most generally accepted alteration of the blood-picture in malaria is the increase of the percentage of large mononuclear and transitional cells. In almost every clinical description of malaria the increase of large mononuclears is mentioned as a constant symptom, which may be of use when no parasites can be found. A number of 15 per cent. or more is considered as a rather certain symptom of malaria.

Many authors, however, make no difference between large mononuclears and large lymphocytes. Now, large lymphocytes and large mononuclears have a superficial likeness, but the circumstances which induce them to appear in the peripheral circulation are quite different. Almost everybody accepts that large mononuclears are to be found in the peripheral circulation, when cell-nests are to be cleared away; they are Metchnikoff's macrophages. Large lymphocytes, which are only younger forms of the ordinary lymphocyte, are of no use for phagocytosis and are only a symptom of lymphocytic regeneration, a very common thing after fever.

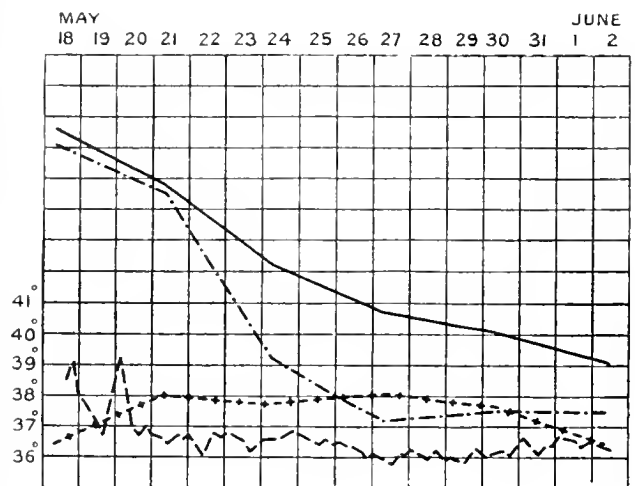
As I did not very often find an increased percentage of large mononuclears in many cases of malaria, and never could find the high percentages (up to 60-70 per cent.) that are mentioned by Stephens and Christophers and by Rogers, I thought it worth while to see what would be left of the mononuclears in malaria if only large mononuclear and transitional cells in the modern hæmatological sense are considered.

To find anything that might be of use in the diagnosis of malaria in the leucocytic blood-picture, I made differential counts at regular intervals during the attack and the whole treatment of fifteen cases of malaria. A graphical reconstruction of the changes in the blood-picture of every case is given.

In the diagrams the temperature is the ——— line; the percentage of large mononuclear and transitional cells taken together the — + — + line; the neutrophile leucocytes a — — — — line, and the percentage of uninuclear neutrophile leucocytes (class I in the system of Arneth) in a continuous line. The counts were made according to the system of

Schilling, who combines the differential count with the Arneth count (see Mense's "Manual of Tropical Diseases"). The cells were counted, while moving the slide in a direction rectangular to that in which the blood was spread, the way as advised by Rogers, but using an oil immersion.

In the diagrams, which are made for degrees of Celsius 37° is the limit of normal temperature. The height of one degree is taken for five cells, and the 0° point of every kind of cell is put in this way, that on the 37° line comes the number that is found in a normal individual. So for the large mononuclear and transitional cells the 37° line indicates 6 per cent., while it indicates for the uninuclear neutrophile leucocytes 40° and for the neutrophile leucocytes 40° (this is the normal average here). Accordingly, in a normal individual, all the lines would follow the 37° line; every deviation from that line shows the sort and degree of deviation from the normal relations. The blood was taken when patients entered the wards, and thereafter always before breakfast; in the beginning every day, afterwards with intervals of three days. Several curves of daily counts proved that, when the fever has subsided, it is sufficient to count with intervals of three days; the blood-picture is not changing so quick that more counts are necessary. Every case got a treatment of fourteen days (15 gr. of quinine hydrochlor. twice a day, and 5 to 10 minims of liq. Fowleri three times a day). After that they left the hospital and were supposed to take 15 gr. of quinine twice a week.



CASE 1.

Case No. 1.—European with subtertian rings in the blood. First attack of malaria. Spleen is enlarged (2 in. below costæ).

May 18, only 3 per cent. large mononuclears, but a considerable shift to the left in the neutrophile blood-picture (52 per cent. for class I of Arneth).

After the fever the number of mononuclears varied from 10 to 11 per cent., while the shift to the left quickly decreased. A fortnight after the



FIG. 1.



FIG. 2.



FIG. 3.

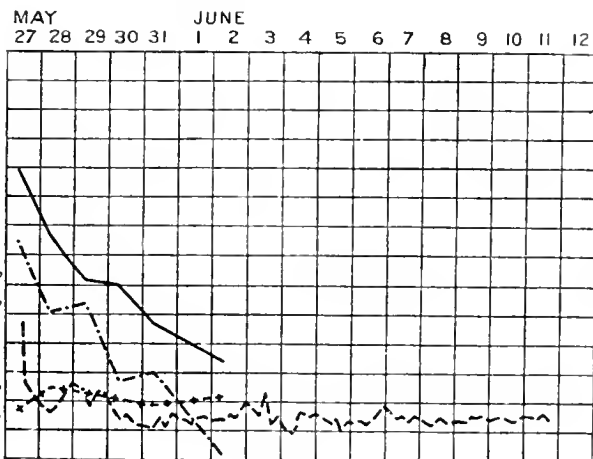


FIG. 4.

To illustrate "Notes on a Case of Tubercular Leprosy Treated by Intravenous Injections of Stibenyl," by
R. G. ARCHIBALD, D.S.O., M.D., Major R.A.M.C. (Retd.).

attack the percentage of mononuclears was $2\frac{1}{2}$ and class I of Arneth had gone down to 14.

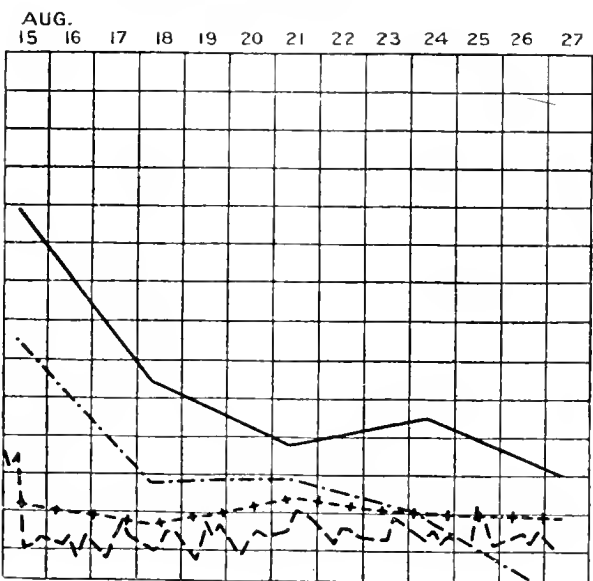
Case No. 2.—Native with subtertian rings in the blood. Spleen enlarged to 4 in. below costæ.



CASE 2.

No mononucleosis. The initial strong shift to the left is going down quickly. Only examined for seven days.

Case No. 3.—Native with subtertian rings in the blood. Spleen is enlarged (4 in.).

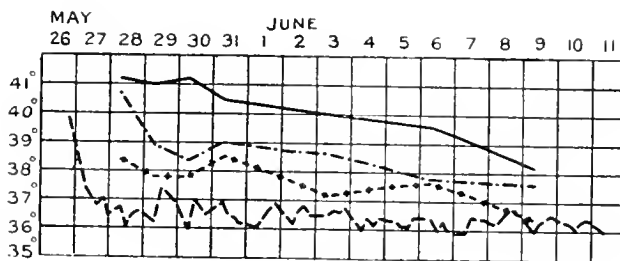


CASE 3.

No mononucleosis. The strong shift to the left is decreasing, first quickly, then slower. After fourteen days only 9 per cent. in class I.

Case No. 4.—Native, subtertian rings in the blood. Spleen only a little enlarged.

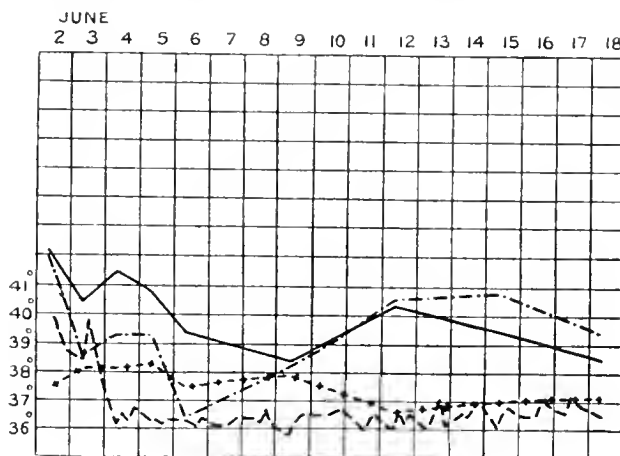
Not counted during the fever. The first ten days from 7 to 13 per cent. large mononuclears. The strong shift to the left is slowly decreasing. After



CASE 4.

fourteen days only 3 per cent. mononuclears and 10 per cent. for class I.

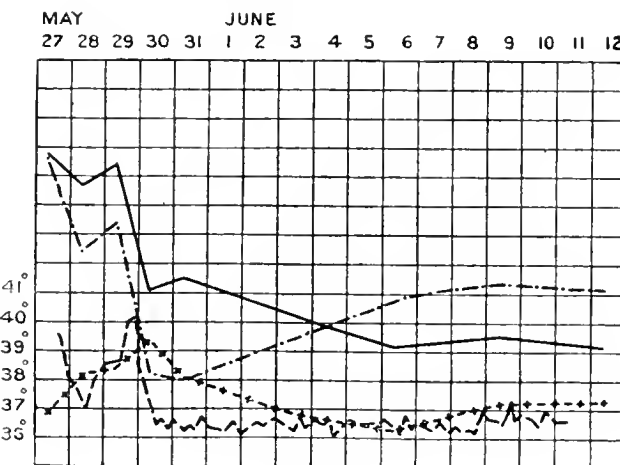
Case No. 5.—Native with schizonts and gametocytes of subtertian and benign tertian fever in the blood. Has been in hospital for malaria five times in the last two years. Spleen is enlarged (4 in.).



CASE 5.

The first week there are 8 to 12 per cent. mononuclears. The strong initial shift to the left is slowly decreasing. After fourteen days there is still 12 per cent. for class I, but no more mononuclears.

Case No. 6.—Native with schizonts and gametocytes of benign tertian fever in the blood. Two

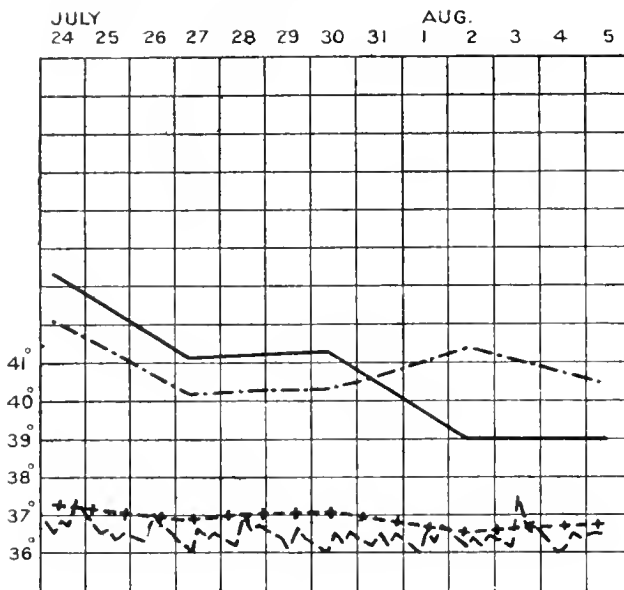


CASE 6.

months ago also in hospital for malaria. Spleen not enlarged.

First examination no mononuclears, then the percentage is increasing to 18 per cent., and then goes down quickly. The strong initial shift to the left decreases quickly and then remains on about the same height (15 per cent. for class I).

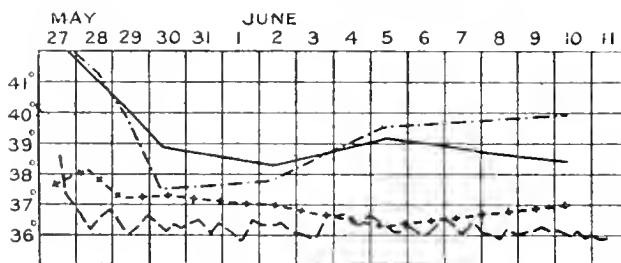
Case No. 7.—Native with schizonts and gametocytes of benign tertian fever in the blood. The spleen is enlarged (4 in.) and is still of the same size after fourteen days.



CASE 7.

No mononucleosis. The strong initial shift to the left decreases a little, but after fourteen days there are still 14 per cent. in class I of Arneth.

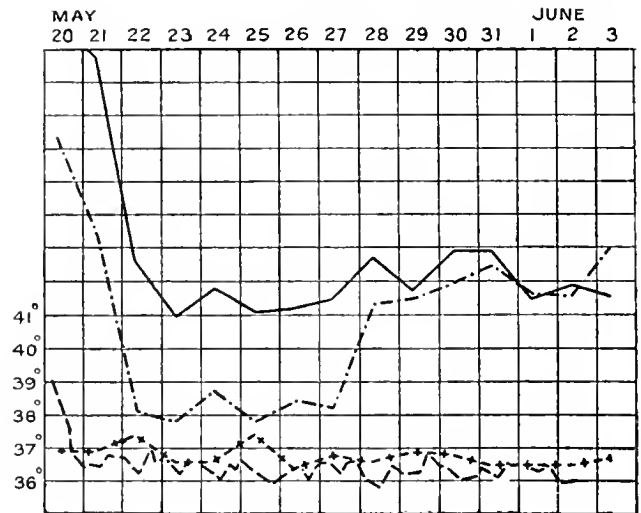
Case No. 8.—Native with subtertian rings in the blood. Chronic malaria. Spleen enlarged (4 in.).



CASE 8.

The first day 9 per cent., the second day 11 per cent. large mononuclears, after that only normal or subnormal numbers. The strong initial shift to the left decreases quickly and then remains on 11 to 15 per cent for class I.

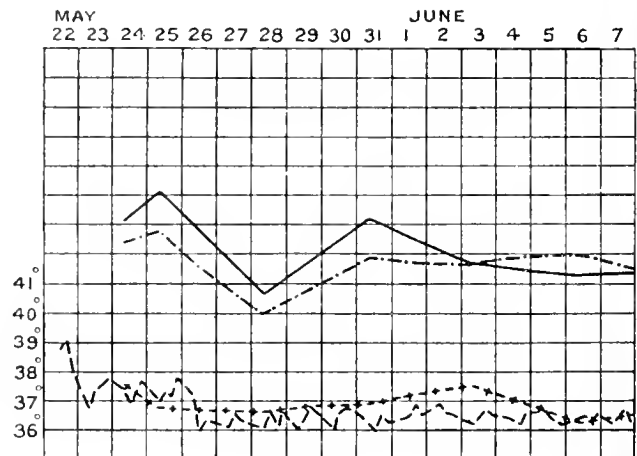
Case No. 9.—Native with schizonts and gametocytes of benign tertian fever in the blood. Two months ago also in hospital with malaria. Spleen enlarged (2 in.).



CASE 9.

No mononucleosis. The very strong initial shift to the left decreases quickly, but remains on a rather high level (20 to 30 per cent.).

Case No. 10.—Native with subtertian rings in the blood. A month ago also in hospital for malaria. Spleen enlarged (2 in.).



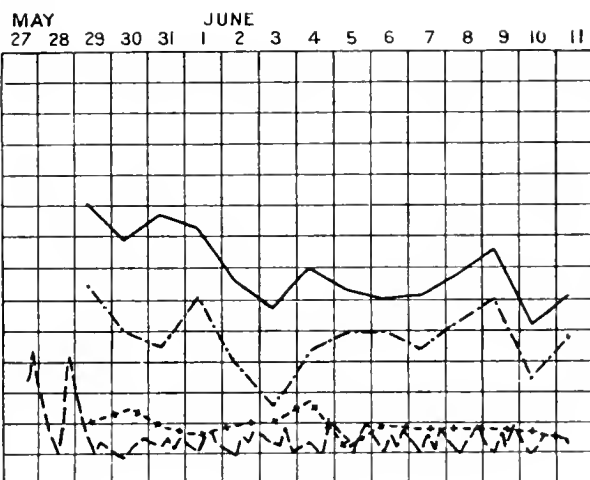
CASE 10.

Not counted during fever. After the fever a strong shift to the left, that remains almost on the same level (25 per cent.). *No mononucleosis.*

Case No. 11.—Native with subtertian rings in the blood. Had several attacks of malaria lately. Spleen is enlarged (2 in.).

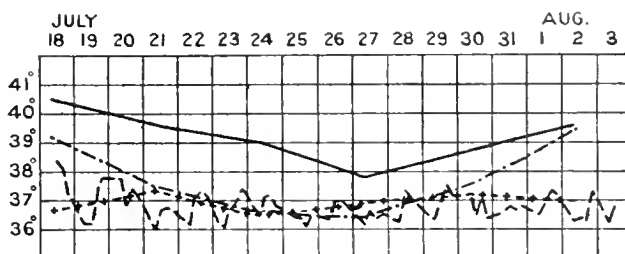
Not counted during fever. *No mononucleosis.* After fever a shift to the left decreasing only a little.

Case No. 12.—Native with rings and crescents of subtertian fever in the blood. Has had already many attacks of malaria. After taking 30 gr. of quinine every day for a month the crescents were still as numerous as before.



CASE 11.

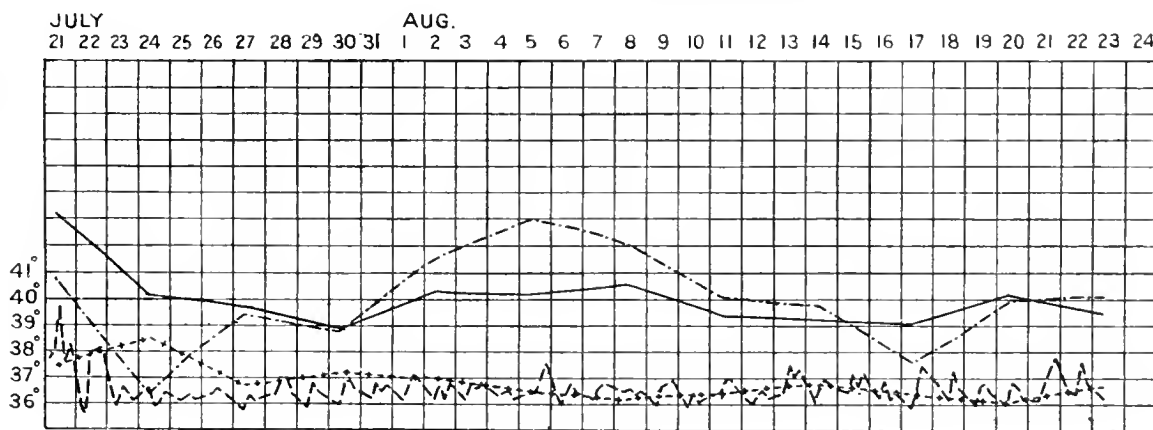
No mononucleosis. Shift to the left is suddenly increasing in the end. Two days after the last count an attack of malaria came, with parasites in the blood. Probably a reinfection, as the man lived in highly infected surroundings and had taken the quinine regularly.



CASE 14.

Case No. 14.—Native with subtertian rings in the blood. Suffered often from malaria.

No mononucleosis. The strong initial shift to the



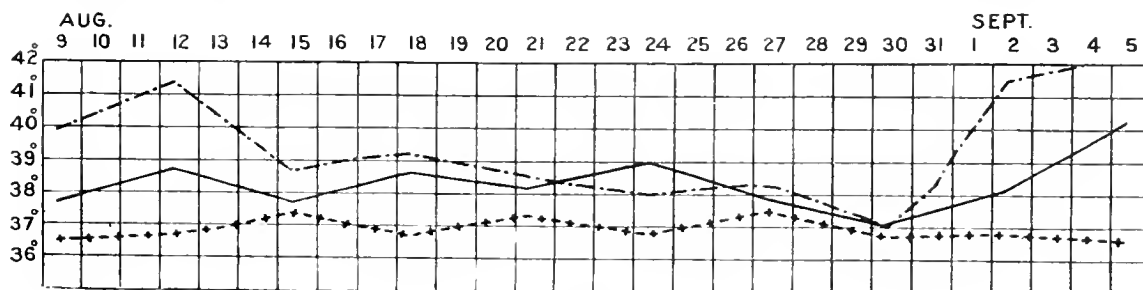
CASE 12.

Mononuclears three days after fever 13 per cent., after that generally *subnormal* figures. The strong initial shift to the left decreases only a little (to 22 per cent.).

Case No. 13.—European with schizonts and gametocytes of benign tertian fever in the blood. Has suffered from several attacks of malaria lately. Spleen only a little enlarged.

left decreases slowly and then increases again. Urine examination shows that the man does not take the quinine, and so this may be the reason for the irregular temperature and the increasing shift to the left.

Case No. 15.—European with schizonts and gametocytes of benign tertian and subtertian fever in the blood. Has often suffered from attacks of



CASE 13.

malaria. Lives in highly infected surroundings. Spleen reaches down to navel. Counted daily.

The first two days only 11 and 10 per cent. large mononuclears, after that only normal and subnormal percentages. The strong initial shift to the left decreases slowly and then increases a little again (to 10 per cent.). Two weeks after the last count the man got an attack of subtertian fever with parasites in the blood while he was still in hospital.

In the present cases out of fifteen only seven showed an increased percentage of large mononuclears and then mostly only for a short time, very irregular, not very high, generally not exceeding 10 to 11 per cent. Only in one case the limit of Stephens and Christophers of 15 per cent. was passed.

Thus, real mononucleosis was found now and then, but was of little use in diagnosis, as it was mostly too little and often totally lacking. A very constant and, in a diagnostic as well as in a prognostic sense, very important symptom proved to be the shift to the left in the Arneth count. In patients affected with malaria a considerable shift to the left in the neutrophile blood-picture, viz., a high percentage of uninuclear neutrophile leuco-

nucleosis is almost useless for the first and quite useless for the second purpose.

The persisting shift to the left is not a new thing. It was found before by Gotheim, Schilling and Scherschmidt. They also assert that this is the most constant of all alterations in the blood-picture in malaria.

My prolonged counts, expressed in these diagrams, may show the value of this symptom a little better. The coincidence between things is shown better than in individual counts.

So we see here that:—

Nos. 1 and 2 are quickly recovering cases.

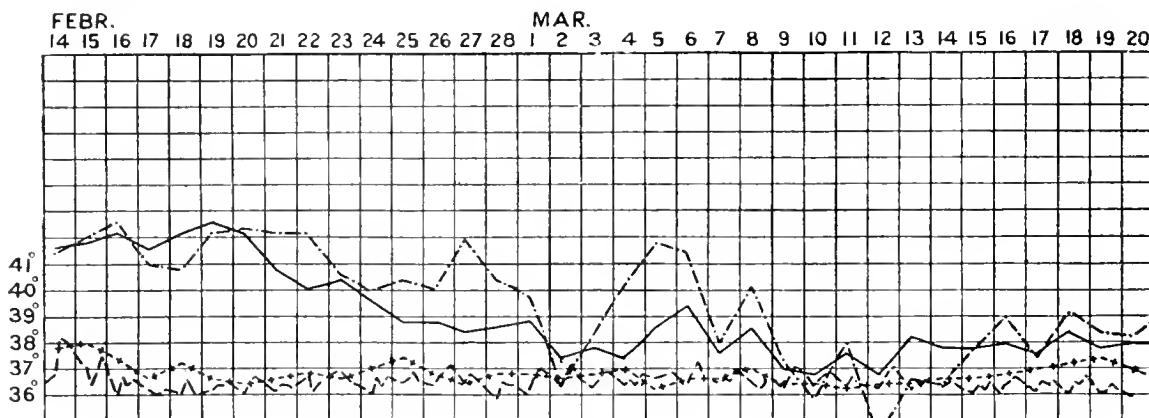
Nos. 3 and 4 slowly recovering cases.

Nos. 5-11 chronic cases, that will only recover quite by a long treatment.

No. 12 a case with persisting crescents, which makes not much progress in recovering.

No. 13 remains on the same level, notwithstanding strong treatment. The relapse is announced by an increase of the shift to the left.

No. 14 does not recover, because in the end of his treatment he does not take his quinine. Symptoms of this are the irregular temperature and the increase of the shift to the left.



CASE 15.

cytes, is persisting for some time after the fever has subsided. These uninuclear forms consist partly of true regenerative forms, partly of degenerative forms, viz., leucocytes with defectively developed nucleus.

In most cases of other fevers we find a shift to the left. So during fever this cannot be used as a symptom for diagnosis in malaria. Outside the attack of fever, especially some time after it, the increase or decrease of the percentage of uninuclear neutrophile leucocytes indicates the course the malaria is taking in that case.

Latent tuberculosis and syphilis will perhaps be able to give a similar blood-picture. So the blood-picture can never be the only symptom, which the diagnosis is based upon, as the finding of parasites in the blood. But for diagnosis of latent cases of malaria, and to see if a treatment is sufficient, it will be of the greatest value; whereas the mono-

No. 15, a very chronic case, with a spleen reaching as far as the navel. The persistent considerable shift to the left, not decreasing even in a month, indicates the lack of a true reconvalescence. This presumption is confirmed by the relapse which soon follows.

As a rule we see that different people show a different degree of shift to the left in malaria, and those who are going to get a relapse show an irregularity of the shift.

CONCLUSIONS.

(1) If we consider only real large mononuclear and transitional cells there is not often mononucleosis in malaria in a degree suitable for diagnosis, viz., more than 15 per cent.

Mononucleosis in malaria is so little and is so

often missing that it can only be of very little use in diagnosis.

The high figures found by others are caused by their mixing up the large mononuclears with the large lymphocytes. The significance of the latter, however, is too different from that of the large mononuclears to allow of taking them together.

(2) A shift to the left in the Arneth count of the neutrophile blood-picture is a most constant symptom in malaria, persisting for a considerable time after the fever has subsided.

The fact that the persistence after the fever is not seen after most other febrile diseases makes it useful as a diagnostic in malaria. Especially when considering the result of a treatment it will be of great value.

As long as the patient, affected with malaria, has a shift to the left there is danger of a relapse. When the shift increases a relapse may be coming.

The method of blood examination as used in this investigation might be of much value when comparing different treatments of malaria.

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STEPHENS and CHRISTOPHERS. "The Practical Study of Malaria."

The Sachs-Georgi Reaction for Syphilis (S. A. Levinson and W. F. Petersen, *Archives of Dermatology and Syphilology*, vol. iii, No. 3, March, 1921).—The authors describe the Sachs-Georgi test in comparison with the Wassermann reaction. This test has frequently been found to be positive when the Wassermann reaction has been negative. It is very simple, only one biological reagent being required (antigen), instead of the four usually used in the Wassermann (antigen, amboceptor, complement and red blood cells). In sixty-two cases in which the Wassermann reaction was negative and the Sachs-Georgi test was positive or doubtful, the clinical history or examination revealed evidence of syphilis in 58 per cent.

Ætiology of Yellow Fever. Behaviour of the Heart in the Experimental Infection of Guinea-pigs and Monkeys with Leptospira Icteroides and Leptospira icterohæmorrhagiae (A. E. Cohn, M.D., and H. Noguchi, M.D., *Journal of Experimental Medicine*, vol. xxxiii, No. 6, June, 1921).—Slowing of the heart occurred in monkeys and guinea-pigs during the febrile period of the experimental infection due to *Leptospira icteroides*. A similar reaction took place in animals inoculated with *L. icterohæmorrhagiae*. The mechanism of slowing was usually due to slowing of the whole heart. Once incomplete heart block was seen. Changes in the ventricular complex occurred four times.

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THE JOURNAL OF

Tropical Medicine and Hygiene

NOVEMBER 1, 1921.

LIFE ASSURANCE IN THE TROPICS.

On October 28, 1921, the President of the Royal Society of Tropical Medicine and Hygiene, Sir James Cantlie, delivered his presidential address. He chose for his subject "Life Assurance as it affects British People taking up Work in the

'Tropics.' Sir James has for twenty years or more devoted his attention to this subject, and has written and spoken in no uncertain language about the anomalies existing in the past and present in that sphere of assurance. His opinions are decided, and he invites discussion upon the matter by medical practitioners who have had experience of insurance work in the tropics. He declares that the methods of judging from local statistics of the healthiness or unhealthiness of any Crown colony, protectorate or dependency as being unsatisfactory and not in accordance with recent developments in tropical medicine. He considers that the extra premium charged men about to proceed to the tropics as being based on data of ancient days when every region between 33° north and 30° south of the Equator was viewed askance from the insurance companies' point of view. Some fifty years ago, he states, our knowledge was chiefly based on information given by ships' captains and others which was mostly gathered from the gossip of the shore folk along the wharves and not from reliable sources. Moreover reliable sources were difficult to find, and the tinge of seafaring men's tales still lingers and affects conclusions as to the unhealthiness of tropical regions.

Sir James contends that no statistics are available in the Crown colonies, &c., where the population of both the European and native are mostly imported. The birth and death estimates of these colonies on European lines are not possible. The Europeans are composed for the most part of unmarried men between the ages of 20 and 38. They come to the district from Europe about the age of 20, and when they get ill leave the tropics for home. They came after the dangers from youthful ailments were over, vaccinated against small-pox, inoculated against typhoid, selected after medical examination as to fitness, and sent away when illness threatened to be serious. Labourers were well-nigh wholly imported, for no Crown Colony produces its own labour. The men who come at ages between 18 and 30 years of age as a rule leave when they get ill or too old to carry on the work required of them. They come as a rule without their wives and children, so that few are born or die in the colony where they work; so that whether Europeans or native the majority of the inhabitants are neither born or die in the colony of their temporary adoption. The statistics therefore founded on European systems of calculation are worthless. Then how are the health records to be gauged? No plan is known or can be devised as far as one can conceive to serve as a guide. Take Hong-Kong, for instance; steamers carry natives backwards and forwards to the mainland in crowds, many thousands daily. In Ceylon the Tamils from Southern India are passing backwards and forwards in thousands; in Mauritius, in the West Indies, New Guinea, the importation and exportation of labourers from beyond their shores proceeds in a constant stream; how can the healthiness of so moving a population be estimated? Yet insurance companies must act upon some rules;

if these cannot be framed on experience gained by local birth and death rates, on what are they founded?

Sir James suggests that instead of following stereotyped rules some modification should be adopted. Seeing it is the young man during the first five years of his residence in the tropics that is most susceptible to disease, and as that is the period when his income is at its lowest and barely sufficient to make ends meet, the extra premium falls upon him most heavily, with the result that he allows his policy to lapse after, say, two years, as he is unable to pay his insurance. Being uninsured, other insurance companies come along, mostly American, and finding this man uninsured and having passed the most dangerous period, namely, the first two years of tropical life, makes a conquest of him and secures a better bargain, seeing that the danger zone is well-nigh over. The original company is not the loser, for their client's payments are appropriated by them "for the risks they have run."

As an alternate scheme to the "hard-baked" one at present in existence Sir James suggests as follows:—

Suppose a young man of 18 insures his life for, say, £1,000, when he enters a bank or a merchant's shipping office in the City of London. After two or three years in this office he usually has to go abroad to one of the overseas offices of the company. Suppose he goes to Ceylon, Hong-Kong, Rhodesia, West Africa, &c., an extra premium of £10 to £40 is imposed upon him, a sum which it may be, and often is, from his small salary, quite impossible to meet. I would suggest that the insurance company does not increase the annual payment, but reduces their liability, say, from 1,000 to £750, or in the case of the more unhealthy regions to even £500 for, say, the first five years, and then according to medical report abate or reduce all restrictions. This would free the young man from increasing his payment and at the same time diminish the risk of the company satisfactorily.

When Sir James read his paper in 1903 on this subject before the Life Assurance Medical Officers' Association the matter created so marked an impression on the members that an adjourned discussion was held, and the chairman of the meeting, Sir Dyce Duckworth, spoke as follows:—

"I am sure we are all interested in this address; in fact, I consider it one of the most valuable and stirring papers which have been brought before the Society. And I think, before we have done with it, or before the insurance offices have done with it, we shall hear a good deal more about it. I think it is a very remarkable paper for several reasons. It is full of good, strong, common sense for one thing. It is the outcome of a man who has had practical experience of tropical life, and who is equipped at all points, as a good physician, a good surgeon, and a shrewd man—one who has the faculty of saying what he thinks, and saying it in very concise and apt language.

"I think we may first remark that there was room for a paper of this kind, and the author shows very plainly that the general principle upon which life assurance for tropical purposes is conducted, is carried on upon lines that may be considered rather effete in these days. I think he proves that part of his case, and I think all experienced insurance office managers will be prepared to allow, at all events, that circumstances have changed, and that, what with rapidity of travel and greater knowledge of hygiene, and the more prudent ways of living which have come in in the last century, the risks of tropical life on these grounds alone are very greatly diminished. Then he shows that mere heat in itself is not an element of danger. I think he is right there. The effects of a warm climate upon British-born people are dealt with by him, and he quotes his experience, which is considerable, and which I think would be borne out by all those who have led tropical life for a time. The great point in the first part of this paper is the study of the effects of tropical life upon young people, especially during the first five years of their residence there. That, of course, is the most critical period. I may say that I myself have had a considerable experience of the influences of tropical life upon Europeans, having been for more than thirty years physician to four or five of the great Indian railway companies, and having had to pass through my hands large numbers of men to go out and serve in India, in different capacities, from important managers, clerks in the offices, engineers, professional men, down to stokers, engine-drivers, railway guards and so on. And having had an experience of sending out numbers of these men, having seen them return from time to time on furlough, and having seen the invalids among them who have come back from various causes, I confess to a considerable experience of the effects of the Indian climate upon Europeans. That leads me to agree in the main with the contentions of Mr. Cantlie that a selected European who is thoroughly sound in all his organs, of good constitution, who is prepared to live temperately, and who is not seduced either by the heat or by the large number of silver rupees which come into his pockets, which he has not been hitherto accustomed to, which in most cases lead him to drink brandy and water—I say, if he can resist all those temptations, and live a wholesome life, that man is likely to put in a very long term of service with perfect impunity as far as the climate goes, more especially if he makes a point of returning home to Europe whenever his leave allows him to do so. The men who take their leave when it is due, and who do not for the sake of saving a few rupees forgo that leave, do the best. The men who come home frequently, even for short leave, distinctly improve their health and their blood in that time, and go back refreshed and strengthened, and are enabled to spend another few years of good work. There is no question that repeated return to this country is beneficial to the majority of even sound, healthy people. The great cause of failure

in such lives as I speak of, which are selected lives, is alcohol. Without any doubt, more especially in the lower classes of men, the artisans, boiler makers, engineers, and engine-drivers, if they go wrong, if their health fails, it is nearly always due to alcoholic intemperance. Sometimes, if they have been sent to feverish malarious districts, they suffer severely from malarial cachexia. There are certain unhealthy stations where these men have to work, and there is no doubt they become severely impregnated. We may hope now that by the light of modern investigations these malarial plague spots may be rendered harmless or nearly so for the future. It was a common idea in old times—and this I get from Sir Ronald Martin, who was one of the good old Indian school in the pre-microbic days—there were shrewd, long-headed men in those days—that you might safely send out to the tropics for Indian careers—and Indian careers in those days meant four months' voyage round the Cape, and to come home once in fifteen or twenty years—young men and youths who had suffered from hæmoptysis. As a rule, they never had any more hæmoptysis; their lungs healed up, and they became perfectly sound. Such subjects, however—I call them strumous people—were noticed to be more liable than others to tropical hepatic abscess. It is an interesting observation that the strumous youths were cured as far as their lungs were concerned, but were prone to suffer from hepatic abscess. There is nothing to explain this observation, but as a piece of accurate observation one must lay stress upon it, and it is worth inquiring into.

"Another point which has been impressed upon me, and which Sir R. Martin also impressed me with, was the decided advisability of not sending anyone to do anything like hard work in India under the age of 23 or 24. Mr. Cantlie especially lays stress upon this, though he makes the age 21, which he considers the minimum one for young men to begin to serve in India. Some of us can remember how the young cadets in the East India Company's service were sent out at the age of 16 or 17, young people in very loose jackets, which they had to fill out on their voyage to India—mere boys, sent out as young officers. Of course, many of them did very well, but experience distinctly shows the great risk of sending lads of 16, 17 or 18 to India who have to do any sort of hard, laborious, or constant work. They may do fairly well, perhaps, as clerks in offices, but to send out recruits or artisans to India at that age is to court a great mortality. It is perfectly certain—statistics prove it to the hilt—that between the age of 17 and 24 the risks from enteric alone are enormous, and that after the age of 24 the liability is materially diminished. That is an important factor which has been borne in upon our military authorities here again and again. They are quite aware of it at the War Office, but circumstances, as a rule, are too strong for them. I have myself known recruits who have joined who have come to me in later years—they tell us things which they will not tell

other people—and given me certain facts. I remember a man telling me he joined when he was 16, calling himself 18. He learned his drill in two or three months in England, and was sent to the Mediterranean to be seasoned and hardened, and before he was 18 he was in India. Within a few months he got enteric fever, and was invalided home, and his career was spoilt for ever after. No doubt even now, under our present system, recruits are sent out to the Mediterranean to harden for a year or two, but many of them arrive in India certainly before they are 20 years of age. That is three or four years too young. That constitutes one of the great arguments in favour of having a special class of men appointed for service in the tropics. That will save money in the end, even if they have to be paid more, because to send out these boys and bring them back, or lose them out there, is a depleting system. It is quite clear that for a life in the tropics, it will be best not to begin it before 23 or 24; after that, the chances of longevity and of the maintenance of health are very much greater. The temptations of India appeal much more to a youth between the age of 18 and 24; afterwards he settles down and offers more resistance to them.

“Now the great trial, in respect of insurance, for people proceeding to the tropics falls upon the young when they are going out for the first time. There is no doubt about that. That is the time when their pay is small, and when the risk to life is greatest. To-day, for instance, I heard of the death of a young Indian civil servant, whom I examined for life assurance some two or three years ago, a very promising young fellow from Oxford, who went out and insured his life, as many such young men do. He was posted to some station in India, and he is already dead, within eighteen months of his life insurance, of enteric fever. That is perhaps the greatest risk which is run nowadays in India. The actual malaria very seldom kills, as Mr. Cantlie points out. It may disable, but a man very seldom gets so saturated with the poison as to die there. He may be damaged, and have to come home to recover, but enteric fever is the great bugbear. I might incidentally allude to the subject of inoculation against enteric fever, and say that my experience of it is decidedly favourable on the whole. I think so well of it that I never hesitate to recommend any young man going out to India or to the tropics for the first time, to be inoculated twice before leaving this country. And I think the statistics, though they by no means show perfect immunity, or even very great immunity, justify the opinion that sufficient immunity is secured to the majority of those who undergo this operation twice—that is, to those who have it effectually done. It is so to such an extent that it is well worth while any young man being inoculated for enteric fever before going to do duty in the tropics. I should make it compulsory for all those in the public service, and recommend it to other people who cannot be put under compulsion.

“Mr. Cantlie speaks of a plan which he proposes

might be brought to bear to relieve the pressure of increased premium as it falls more especially upon young men starting out to the tropics. His proposal is this: ‘Supposing a young man goes to Ceylon or Hong-Kong, an extra premium of, it may be, £10 or thereby, is imposed upon him, a sum which it may be and often is quite impossible from his small salary to meet. To overcome this difficulty, he suggests that the insurance company does not increase the annual payment, but reduces the liability, say, from £1,000 to £750; or in the case of a more unhealthy region, say Mauritius or British Guinea, to even £500, for say the first five or seven years, and then, according to medical report, abate or reduce the restrictions. This would free the young man from increasing his payment, and at the same time diminish the risk of the company satisfactorily. I do not know if business men would accept the principle, but to me it seems feasible and fair. I happened to see the manager of my own insurance office to-day, and I put this to him. He said it was nonsense on the face of it, and that no insurance office would contemplate such a matter as sound business. He went on further to repudiate several of the assertions of Mr. Cantlie throughout this paper, which he had read, and to say that these matters do not, as Mr. Cantlie says, rest entirely on the *dicta* of the doctors. He says on page 122, ‘I would recommend British insurance offices to rely for advice as regards the value of the lives of tropical residents on the medical officers of their companies, and not on their actuaries. The actuary cannot know, he has no means of knowing, the effect of climate or the local state of healthfulness in any individual colony.’ Then he goes on to say that the actuaries’ figures are misleading, and his statistics of no use to him there. To-day I was told that that was not the case. I was told there was a great deal of mathematics in these cases, and that it is not merely an opinion formed on mere climate which the person goes to, but that there are actuarial matters of great importance which we doctors are not supposed thoroughly to understand. However, Mr. Cantlie has the courage of his opinions, which is a very good thing, and not often to be met with, and he says he tenders the advice, not from interested motives, because he is not a member of our Society, and does not hold the post of medical officer to any insurance society, nor does he think that he is ever likely to be asked to do so. I am not so sure of that. I think when this paper is read to the offices, the opinions regarding Mr. Cantlie will cause him to become a most desirable person, not only to become a member of this Society, but I should think the offices would bid very highly for him, because they will know he is a man with practical experience of these matters, and if they can join on his technical skill to the actuarial skill which they can provide, I think the public will be very well served.

“There are many points in this paper—for instance, such as relate to diet, on which he throws

great light—matters which are not sufficiently understood in this country. I am entirely with him where he points out how some of the best lives we know, and some of the healthiest old men we meet in this country, are men who have spent twenty and thirty years in tropical countries, who come home looking as robust and rosy as when they went out, who begin a new life at home and go on for another twenty years enjoying their pensions, and living out a full wholesome life, not a bit injured by tropical influences. We used to hear that large numbers of men died in India, but when we remember how they lived in those days, the enormous quantity of alcohol they drank, the absurd way in which they dressed, the ignorance there was of health matters generally, and the absence of rapid communication with home, we shall not be surprised. They went there and did not come back for twenty years, and by that time they had acquired all sorts of injurious habits, and they were devitalized, so that they were sent back to die. Young men go to India and come back, and when you meet them you forget they have been away. Now they are all taught to drink boiled water and milk, and not to drink spirits, and to be prudent and careful in their manner of life, and above all things to take exercise and not to take ease. Amongst the results of tropical life are the exhaustion induced by the constant high temperature, and the slackness and fatigue and desire for an easy chair which it produces. I have been in India myself, and I know something of this, and what the temptation is, and how it must be resisted. It is much easier for young men to begin resisting these things, coming out, as they often do, from a university or public school—to keep up their athletics and use their muscles. So long as they do not give themselves over to the habit of going to sleep after dinner and taking their ease, and can be active and avoid strong drinks, they are quite likely to put in a full useful term of life. These things being so, it is quite clear that insurance offices ought to think more favourably than they do of the risks in such cases. Then again, these risks are constantly diminishing. Every year, with increased knowledge and increased power and ease of locomotion, must add to the betterment of these lives, and the risks thereby diminish year by year. I am quite prepared—I was prepared to-day—to hear that the manager of my own office agreed with Mr. Cantlie in the view that the principles they acted upon were not up to date. I think, as I said before, that this paper has already fluttered the dovescots of the insurance offices, and I think we shall hear more about it in due time. I think the issue cannot fail to be that more easy terms will be provided, especially for the young men going out to the tropics.

“Mr. Holt, my manager, to-day entirely combated the view of Mr. Cantlie that the American offices were stealing a march upon us, and were securing the lives which we lost. He denied that *in toto*. I was very glad to hear the denial on such authority, but I told him that Mr. Cantlie's experi-

ence was gained on the other side of the world, and he was simply stating what he knew. He denied that, and he also went on to say that the terms which these American offices demanded, the various clauses put into these policies were so hampering, and the conditions so severe, that anybody getting into the toils of an American company would be very pleased to exchange and get into the wider meshes of an English one.

“I regard this paper as a sort of State paper—I think it is epoch-making. It is so fresh and so outspoken and so redolent of good sense, that coming, as I said, from a man who has practical knowledge of what he is talking about, and who has the courage to say it, I think we are very much indebted to him.”

Abstracts and Excerpts.

APPENDICITIS CAUSED BY *ENDAMÆBA HISTOLYTICA*; WITH POST-OPERATIVE AMEBIC ULCER PERFORATION OF CÆCUM.¹

By E. P. HOGAN, A.M., M.D.

VERY little information is given in medical literature on amœbic infections in which the appendix is involved. Lenz reports one case of appendicitis in amœbic dysentery. The appendix was removed, but as far as the report shows was not examined to determine whether or not amœbas were present. He states that “perhaps” amœbas had lodged in the appendix.

Le Roy des Barres reports three cases of appendicitis occurring in conjunction with, or following, amœbic dysentery. Operation was performed in two of these cases, but no endamœbas were found in the appendix in either case. He is of the opinion that in some cases the amœbas penetrate the walls of the appendix and are instrumental in causing inflammation (although he cites no cases illustrating this). In other cases in which appendicitis is associated with amœbic dysentery, he believes it to be due to bacterial infection resulting from ulceration of the cæcum.

Vives states that true appendicitis may occur in acute dysentery, ulceration of the appendix giving rise to clinical symptoms of appendicitis. As a rule, however, the appendicitis is masked by the dysenteric phenomena or by the symptoms of general peritonitis due to perforation of the appendix. The condition is usually first revealed at the necropsy. In addition to true appendicitis, in cases of chronic relapsing dysentery there is a pseudo-appendicular syndrome characterized by the clinical symptoms of appendicitis, but without anatomic lesions in the appendix. The condition is probably due to dysenteric lesions in the cæcum, which are almost constant in fatal cases. Vives

¹ Abstracted from *Journ. Amer. Med. Assoc.*, vol. lxxv, No. 11, September 11, 1920.

has found that appendicitis, both true and false, is more frequent in amœbic dysentery than in bacillary dysentery or unclassified dysenteries.

The case that I report is unique in that it is complete, both from a clinical and a pathologic standpoint, for a diagnosis of appendicitis was made and the patient operated upon, and the pathologic examination revealed a true inflammatory condition existing within the appendix, involving the mucous and submucous coats, in which *Endamæba histolytica* could be demonstrated.

CONCLUSIONS.

(1) Intestinal amœbiasis may exist without diarrhoeic and dysenteric history or symptoms.

(2) *Endamæba histolytica* will at times invade the appendix and produce typical symptoms of appendicitis.

(3) Every appendix removed should be examined and reported on by a competent pathologist, and in every case of appendicitis the cause of the appendicitis should be established, and other foci of infection should be sought and treated.

Current Literature.

THE INDIAN MEDICAL GAZETTE. Vol. LVI, No. 9, (September, 1921.)

Chronic Dysenteric Peritonitis (J. W. Megaw, M.B.).—Most of the cases of ascites, which occur in the United Provinces, follow on diarrhoea or dysentery, which most probably are caused by the bacillus of Flexner, or some closely related organism.

The ascites is due to a fibrosis of the peritoneum which follows on inflammation of the peritoneum; this is probably caused by the passage of an irritant toxin of bacillary origin through the wall of the large intestine. The fibrosis of the peritoneum may give rise to an excessive outpouring of the fluid into the peritoneal cavity, or re-absorption of fluid may be diminished. The disease is much more likely to occur in cases of dysentery treated by opiates or not treated at all. In those treated by salines or other aperients, the disease is not likely to occur, as stasis and excessive accumulation of the toxins are not likely to occur. When the disease is established, there is little prospect of a "cure." In slight cases there may be some prospect of relief by establishing a drain into the connective tissues, but in severe cases, in which large quantities of ascitic fluid are poured out, there seems to be little hope of restoring the nutritious fluid to the body tissues.

A Further Note on the Results of Influenza Vaccine Inoculation (Major H. R. Dutton, I.M.S.).—The author comes to the conclusion that protection is not fully developed until about three days after the second dose of inoculation although even the first dose confers some slight protection. Curative doses of vaccine are extremely valuable in bronchopneumonia, but less so in lobar pneumonia and the mortality is very considerably lessened by its use.

Complete protection is of short duration, probably

not exceeding three months, but the severity of the attack is lessened and serious complications avoided by prophylactic inoculations, even although given several months before the attack.

The Present Position with regard to the Treatment of Ankylostomiasis (J. Borland McVail, M.R.C.S.).—Of the many cures recommended for the treatment of hookworm, i.e., thymol, betanaphthol, E.C.C. mixture (eucalyptus, chloroform, castor oil), chenopodium oil, podophyllin, guaiacol, peppermint oil, male fern, areca nut and others the author narrows the field of choice to two—thymol and oil of chenopodium. With each certain and different precautions are necessary and the final choice will depend upon the practicability of carrying out these precautions in the particular case. In both cases the treatment can be repeated weekly, but to avoid cumulative toxicity not less than a week's interval must be allowed.

Addendum to Auto-hæmic or Auto-serum Therapy (D. N. Sen, I.M.S.).—The treatment of patients is generally carried out by any of the following agents: normal serum, defibrinated blood, or hæmolysed blood of the patient. The preparation of the first two agents is quite a simple matter and can be carried out by the bedside of the patient, who receives the injection within a few minutes of the withdrawal of blood. The method of hæmolysing the blood is a bit complex but with a little care and practice it is not at all tedious. Any of the above agents may be used according to the choice and convenience of the practitioner in the treatment of diseases with equally good results. The subject of auto-hæmic therapy affords ample field for further investigation. The consensus of opinion is that this treatment has been well tested in functional and metabolic disorders and has proved of much value; but in bacterial diseases, how far it is efficacious has not yet been fully determined.

Osmosis through the Skin (Dwarkanath Prasad Bhargava, M.B.).—The author describes a case of Bright's disease which he treated by osmosis. The patient was put on a milk diet and given saline baths for two hours twice a day. Doses of tinct. ferri. perchlor. were given, but all other medicines were stopped. The results were most successful. It was noted that the amount of osmosis through the skin varied directly but approximately with the strength of salt solution. It also varied with time and with the tension of fluid in oedematous skin.

Medical News.

Radium found in the Congo and in Brazil.—According to the *Scalpel* of Brussels, minerals containing large amounts of radium have been discovered in the Congo. The *Brazil Medico* announces that large quantities of mineral possessing remarkable radio-active properties have been discovered by Prof. Cleef in the district of Minas Geraes.

Original Communications.

CHARCOT-LEYDEN CRYSTALS IN THE STOOLS AS AN AID TO THE DIAGNOSIS OF ENTAMÆBIC DYSENTERY.

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INTRODUCTION.

For a considerable time past it has been usual to associate Charcot-Leyden crystals in human stools with helminthic infections. Stitt mentions that in sputa "Charcot-Leyden crystals have no special significance, except in certain tropical diseases, when these crystals often are present in paragonimiasis sputum and in the pus of amœbic abscesses discharging by way of the lungs"; and, further, he states that, while never present in the stools of cases of bacillary dysentery, these crystals occur fairly frequently in cases of amœbic dysentery. In addition he says, "Of course they occur in other intestinal parasite infections." Castellani and Chalmers associate Charcot-Leyden crystals in the stools with ankylostomiasis, but agree that they may occur in the stools of the acute types of entamœbic dysentery, and, rarely, in the pus of liver abscesses.

Ashford and Igaravidez, 1911, in describing uncinariasis (Hookworm disease), state that "these (Charcot-Leyden crystals) are very frequent in the feces of a patient infected with uncinaria, sometimes they are found in enormous numbers. They are a valuable sign when ova of uncinaria are not readily found, although they are observed in the presence of other intestinal parasites. We have not been able to establish any clear relation between their abundance and eosinophilia. Of the Ponce series of 1902, eleven had Charcot-Leyden crystals; in the Utuado series of 1904, thirty-five had them; in a total of eighty cases, forty-six, or 57.5 per cent., had these crystals in the feces." They make no mention as to whether any of these cases had entamœbiasis as well.

Barthélemy, 1917, after discussing the probable composition of these crystals, goes on to say that "Quoi qu'il en soit, leur présence, sans avoir une valeur absolue, est une indice d'helminthiase intestinale. Ils sont à peu près constants dans l'ankylostomiase, fréquents dans l'ascariose, l'oxyurose, ou dans l'infection par un Cestode (sauf l'*Hymenolepis nana*), plus rares avec les autres Vers." Barthélemy does not appear to have associated them in any way with infection due to *Entamœba histolytica*.

Thomson and Hirst, 1918, describing the stools of entamœbic dysentery, come to the following conclusions: "A very common feature of these amœbic stools is the presence of Charcot-Leyden

crystals caused by the breaking down of the red cells by the action of the *Entamœba*. Charcot-Leyden crystals, although not pathognomonic of amœbic dysentery, are, in our experience, very suggestive of the condition, and we have noted their frequency in cases of cyst carriers with no obvious blood in the stools."

In his very interesting paper, Acton, 1918, states that a very high degree of association exists between *E. histolytica* and Charcot-Leyden crystals, that they do not occur in infections with intestinal entozoa, and that in the absence of amœbæ their presence is indicative of amœbic colitis.

Shipley, 1907, when examining the dejecta of grouse, found that "Two kinds of crystals were also abundant, one resembling the Charcot-Leyden crystals, whose presence is usually associated with parasites in the intestine, the other resembling the crystals of magnesium ammonium phosphate." Unfortunately, Shipley has omitted otherwise to describe or figure these crystals, and he does not indicate whether they were found in association with special helminthic infection, or whether they occurred in coccidiosis.

Acton, 1918, found Charcot-Leyden crystals in thirty-two out of four hundred cases of intestinal helminthiasis, which he extracted from his records. He goes on to say: "Of these thirty-two cases, in twenty-eight *E. histolytica* cysts or minuta forms were also found. Thus we may assume that, in the absence of amœbic infections, Charcot-Leyden crystals are rarely found with pure intestinal entozoal infections."

From our own observations on this subject, it is certain that Charcot-Leyden crystals occur in the stools of human cases suffering from entamœbiasis, from which all possibility of a super-imposed helminthic infection has been excluded; it yet remains to be proved that they may occur in helminthiasis *per se*.

THE PERCENTAGE OF CASES IN WHICH CHARCOT-LEYDEN CRYSTALS OCCUR.

Acton found that 20.4 per cent. of the cases in which entamœbic dysentery was diagnosed by the finding of *E. histolytica*, either in the free or the encysted state, showed, at some time or other the presence of Charcot-Leyden crystals in the stools. He, further, found that the more chronic the disease the greater was the probability of Charcot-Leyden crystals being found.

In our experience the percentage of cases showing these crystals in amœbic stools was twenty-five, considerably higher than Acton's percentage, and probably due to the fact that nearly all the cases, we had the opportunity of examining, were of the chronic type, many of them, indeed, having suffered from the disease for years. Since publishing the results which gave us this percentage (Thomson and Robertson, 1921), we have had, thanks to the courtesy of Dr. Broughton-Alcock and others, the opportunity of examining a considerable number of stools in which either the free.

vegetative forms, or the cysts of *E. histolytica* were present, and in ten of these stools we found Charcot-Leyden crystals. The addition of this number practically leaves our percentage *in statu quo*. It is interesting to note, however, especially in view of the work on the grouse by Shipley, that one stool received from Dr. Broughton-Alcock contained, in addition to numerous Charcot-Leyden crystals, the oöcysts of *Isospora hominis*, and that it was only after a prolonged search that a free, vegetative *Entamæba* of undetermined species was found. Unfortunately, we were unable to pursue the cases further.

Houghwout, 1921, reports that in the stools of a patient suffering from an infection with *I. hominis* he found "Charcot-Leyden crystals of the short form." He does not figure these crystals. Previously a small amœba was found in the stools of the same patient, but unfortunately its species was not identified, and after this occasion the amœbæ did not reappear, nor were blood or tissue elements present in the stools. The period during which the patient was under observation was from February 9 to April 10. It is obvious that the possibility of a chronic entamœbiasis with *I. hominis* infection super-imposed has not been excluded, especially in view of the fact that undoubted amœbæ of some unrecognized species were found, and also that cysts or free vegetative forms of *E. histolytica* are by no means present in every stool, but may only appear at intervals.

Houghwout goes on to say that "Parenthetically it might be mentioned that Noc, who has recently reported a case of infection with this parasite, . . . found in the stools of his patient some crystals in the form of elongated lozenges, which, he believes, were fatty acid crystals. These, I am inclined to believe, may have been Charcot-Leyden crystals." On referring to the original paper by Noc, 1920, the only mention made is "des cristaux d'acides gras en forme de losange allongé." It is impossible, since Noc does not figure these crystals, and in the face of his description of them as fatty acid crystals, to accept this evidence that Charcot-Leyden crystals did occur in this case.

While serving in Egypt during the war one of us (J. G. Thomson) found the oöcysts of *I. hominis* in the stools of eleven cases. These cases were all soldiers and the areas they served in, together with the year in which the disease was diagnosed, are as follows:—

Area	Year	Cases
Egypt and Gallipoli	1915	4
Egypt and Salonica	1916	4
Egypt, Macedonia and India	1916	1
Egypt and Trinidad	1916	1
Egypt	1917	1

Of these eleven cases one was also found to have *E. histolytica* in the stools, two had mucus and degenerate cells but no *Entamæba*, and the remainder had, other than the oöcysts of the *Isospora*, no abnormality either macroscopically or microscopically. Cultures were negative to the bacillary

group of organisms. No Charcot-Leyden crystals were found in any of these cases.

DESCRIPTION OF THE CRYSTALS.

The largest number of crystals we have seen in any given specimen was in the mucus from the surfaces of amœbic ulcers obtained during sigmoidoscopic examination (Manson Bahr and Gregg, 1921). In six specimens obtained in this manner we have found Charcot-Leyden crystals, some showing both crystals and *Entamæba*, others crystals alone. The crystals in the scrapings are frequently arranged in clumps and vary considerably in size.

In the formed stool, on the other hand, which may or may not have small glistening points of mucus on the surface, and which, if *Entamæba* be present at all, contains the cystic forms, the crystals tend to be few and far between. In such stools the finding of a crystal may be the only indication of entamœbiasis, and the only hint obtained, apart, of course, from the history of the case, that further search for the parasite would be likely to yield eventually a positive result. The crystals in the "sago grain" mucus of the stool typical of amœbic dysentery during the acute exacerbations may be numerous or scanty. When present their numbers, while, perhaps, not quite so great as in a corresponding amount of mucus from a sigmoidoscopic scraping, are still sufficient to make their detection by no means difficult.

As regards the size of the crystals there is considerable variation. Barthélemy (*vide supra*) found them to be rarely more than 40 microns in length; we have found them up to 70 microns, and even longer. The average size is usually between 5 microns and 25 microns. Roughly speaking, when very numerous, the crystals do not tend to be large in size; the largest crystals are probably to be found in the stools containing only a moderate number.

In shape they are typically like a whetstone, or, as Barthélemy puts it, "Ils se présentent sous la forme d'un losange effilé à l'aspect de pierre à aiguiser." They are soluble in warm water, acetic acid, and strong mineral acids and alkalis (cf. fatty acid crystals, which are not readily soluble in hydrochloric acid), but insoluble in cold water, alcohol, ether, glycerine, xylol, chloroform, &c.

THE POSSIBLE ORIGIN OF CHARCOT-LEYDEN CRYSTALS.

While, in the absence of full information regarding the chemical composition of Charcot-Leyden crystals, it is impossible to say definitely from what substance or combination of substances they may take origin, there are yet several salient features connected with their occurrence which must be mentioned. Firstly, they are most commonly found in mucus. In bronchiectasis and in asthma they occur in the mucus of the sputum, and in stools it is extremely rare to find them when no mucus is present; secondly, they occur in diseases where there is a breaking down of proteid materials, e.g.,

the histolytic action of the *Entamoeba* on the wall of the gut; and, thirdly, they appear in conditions where there is destruction of cells especially rich in lipoids, which, of course, may be typified by the red blood corpuscle, the favourite food of *E. histolytica*, the envelopes of which are peculiarly rich in lipoids. McJunkin, 1919, stated that they may result from eosinophile cells *in vitro*, and Ciaccio has drawn attention to the fact that the granules of the eosinophiles are very rich in lipoids.

Thus the crystals may possibly be the product of some excretion of the *Entamoeba*, either by itself or in combination with some mucilaginous substance or other content of the gut. Again, they may be part of the proteid or lipid content of the cells, which have been dissolved by the histolytic action of the *Entamoeba*, and then either crystallized out or first combined with some other substance. What they are and what they are derived from at the present we cannot say with any degree of certainty, but it is definite that they are connected in some manner with the activities of *E. histolytica*.

THE DIAGNOSIS OF AMOEBIC DYSENTERY.

It is a well-known fact that every stool from a patient suffering from entamoebiasis does not contain the *Entamoeba* in demonstrable numbers, and, indeed, in chronic cases, considerable periods, sometimes amounting to weeks, may elapse between the appearance of cysts in the stools in sufficient numbers to make the diagnosis certain. Under such circumstances, and especially if the clinical aspect of the case is in any way doubtful, considerable delay may result before treatment is begun. To obviate this delay, which is obviously neither in the interests of the patient nor of his medical attendant, all the evidence obtainable should be made use of, such as the macroscopic appearances of the stools, the presence or absence of pus cells, epithelial cells, mucus, blood, &c., and the laboratory worker should make a point of reporting his findings in this respect to the clinician.

Our contention is that, while persistent efforts should be made by the protozoologist to find the *Entamoeba* by examining large numbers of stools over a long period of time, Charcot-Leyden crystals, which are found in from 20 to 25 per cent. of cases of entamoebiasis, and which, to our knowledge, have never been found in any other condition of the human intestine when all possibility of infection with *E. histolytica* has been excluded, may supply contributory evidence, together with the other clinical findings sufficient, in the absence of *Entamoeba* from the stools, to justify the commencement of treatment by the clinician.

Dobell and O'Connor, 1921, characterize such methods of arriving at a diagnosis as "clinical makeshifts," and dismiss the question of Charcot-Leyden crystals as an aid to the diagnosis of entamoebic dysentery by stating that Barthélemy found them to be associated with helminthic infections. On referring to Barthélemy's original work,

we find that that author, as quoted above, contents himself by stating that Charcot-Leyden crystals are an indication of intestinal helminthiasis, he does not say how this decision is arrived at, nor does he even mention their occurrence in entamoebic dysentery.

CONCLUSION.

It must be obvious, in view of the literature on Charcot-Leyden crystals in the faeces, some of which we have quoted, that a considerable amount of work still remains to be done in making clear their exact significance. It would be most valuable if it could be proved that these crystals may, or may not, be found in pure intestinal helminthiasis cases. This would entail the examination of large numbers of stools from persons suffering from helminthiasis over a prolonged period of time in order to exclude chronic entamoebiasis. Further, human coccidiosis must be studied, and, if Charcot-Leyden crystals happened to appear in the stools, prolonged search must be made to decide on the presence or absence of *E. histolytica*. It would also be interesting to have reports on the appearance or non-appearance of Charcot-Leyden crystals in other ulcerative conditions of the gut, such as tuberculosis, ulcerated neoplasms, &c.

As regards the true dysenteries, that is to say, of either bacillary or entamoebic origin, we believe that the presence of Charcot-Leyden crystals in the stools is diagnostic of colitis due to *E. histolytica*.

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DESCRIPTION OF PLATES.

PLATE I.

Photomicrographs.

All the specimens were stained with Heidenhain's iron hæmatoxylin and were photographed at a magnification of $\times 700$ approx.

FIG. 1.—Smear of mucus from a stool during an exacerbation of entamœbic dysentery. Numerous Charcot-Leyden crystals of different sizes.

FIGS. 2 and 4.—Smears of mucus from the surfaces of entamœbic ulcers obtained sigmoidoscopically. Shows the crystals in clumps.

FIG. 3.—Smear of mucus from sigmoidoscopic scraping of an ulcer containing numerous fairly large crystals.

FIG. 5.—Shows a typical field of the microscope from a smear of the mucus during an acute exacerbation of entamœbic dysentery.

The *Entamœba histolytica* is lying in the mucus surrounded by numerous red blood cells, and has a Charcot Leyden crystal in its vicinity.

PLATE II.

All the specimens were drawn with the camera lucida at a magnification of $\times 2,200$ approx. With the exception of the oöcysts of *Isospora hominis*, which were drawn while fresh, all were stained with Heidenhain's iron hæmatoxylin.

FIG. 1.—Charcot Leyden crystals from a smear of fæces which contained the cysts of *E. histolytica*.

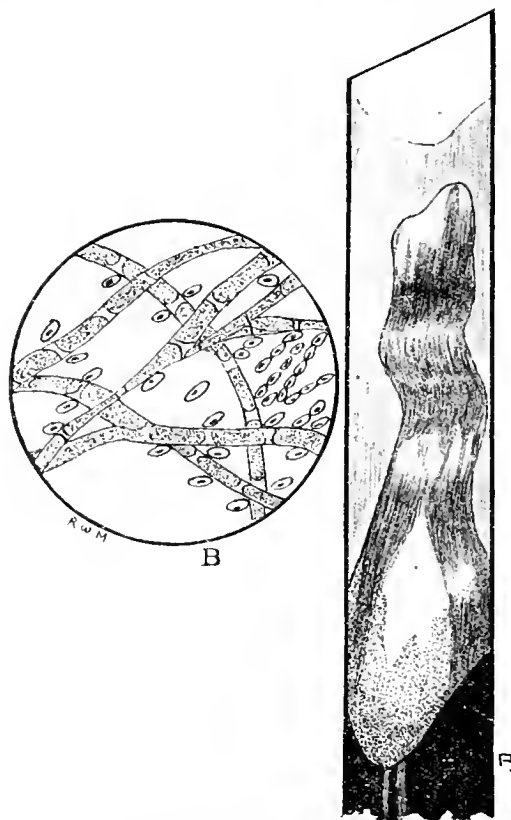
FIG. 2.—Smear of mucus obtained sigmoidoscopically from the surface of an entamœbic ulcer. Shows large numbers of crystals all much about the same size.

FIG. 3.—Smear of the "sago grain" mucus from a stool during an acute exacerbation. The crystals show considerable variation in size.

FIG. 4.—*E. histolytica*, free vegetative form, found in the mucus of an Egyptian case, containing in its endoplasm Charcot-Leyden crystals. This is the second specimen found by the authors containing these crystals within the cytoplasm.

FIG. 5.—Oöcysts of *I. hominis*. A, as freshly passed. B, after remaining at room temperature for two days.

From a case of Human Coccidiosis (J. G. Thomson's case, Egypt.)



A—Glucose Agar Culture Monilia—undetermined.
B—Stained with Methylene Blue.

EXPERIMENTAL PULMONARY MYCOSIS IN GUINEA-PIGS.

By RALPH W. MENDELSON, M.D.,

Principal Medical Officer of Health, Royal Siamese Government,
Bangkok, Siam.

In a short paper in the *Journal of the American Medical Association*, July 9, 1921, attention was called to the widespread prevalence of pulmonary mycotic infections as observed in Siam. In that article mention was made of the fact that the symptomatology of the disease was seemingly the same, no matter what species of mould was found in the lung. In order to test out the pathogenicity of some of the moulds from a large collection recovered from human cases of pulmonary mycosis, I have started by selecting one at random and using it for the purpose of producing an experimental pulmonary mycosis in guinea-pigs.

The monilia selected grows abundantly on ordinary glucose agar. At first white, it gradually produces a dark brown pigment, the same turning black in the course of a month. At the base of the tube, short drum-stick like mycelia appear and gradually ascending the tube cover the entire growth at the end of three to four weeks. The illustration is the growth at the end of three weeks.

Several guinea-pigs were infected and kept under careful observation for the period of one month. During this time none of the infected pigs showed signs of active illness. At the end of the month they were killed and examined to determine the presence of lesions, and if present to what extent the lung tissue was involved without having produced any signs or symptoms. It is to be understood that control pigs were of course kept under observation at the same time and under the same conditions, and also their lungs subjected to microscopic examination.

On cut section some of the lungs present an interesting picture. From the illustration it will be seen that there are present, tumour-like masses, that resemble very much the condition found in cases of tuberculosis of the lungs. But these small masses are not tubercles, they are mycotic tumours and when examined are found to be made up of connective tissue. A similar condition was found in some human cases. These mycotic tumours are seemingly nourished from the surrounding healthy tissues and they do not have a tendency to break down.

Microscopically the lungs contained a number of areas that were partly or entirely solid. These were mostly small, but a few were fairly large, most of the involved area being just beneath the pleura. The solidification was due to different conditions, in some instances the air vesicles being filled with red blood cells, in others there being also some fibrin. In certain small patches leucocytes, mostly mononuclear,

PLATE I.



FIG. 1.

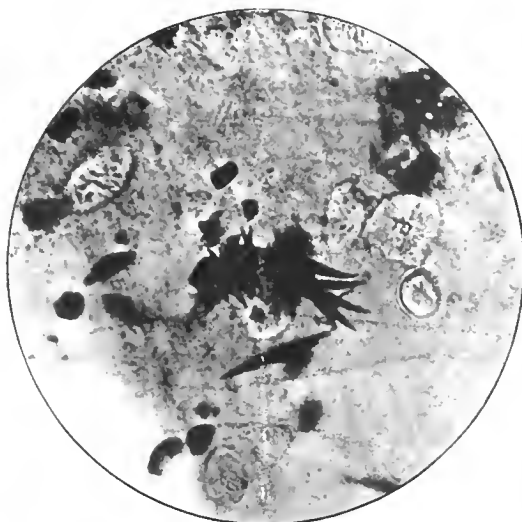


FIG. 2.

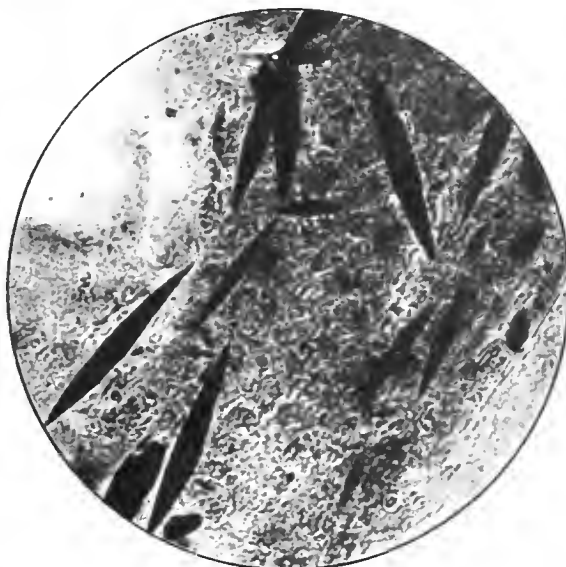


FIG. 3.



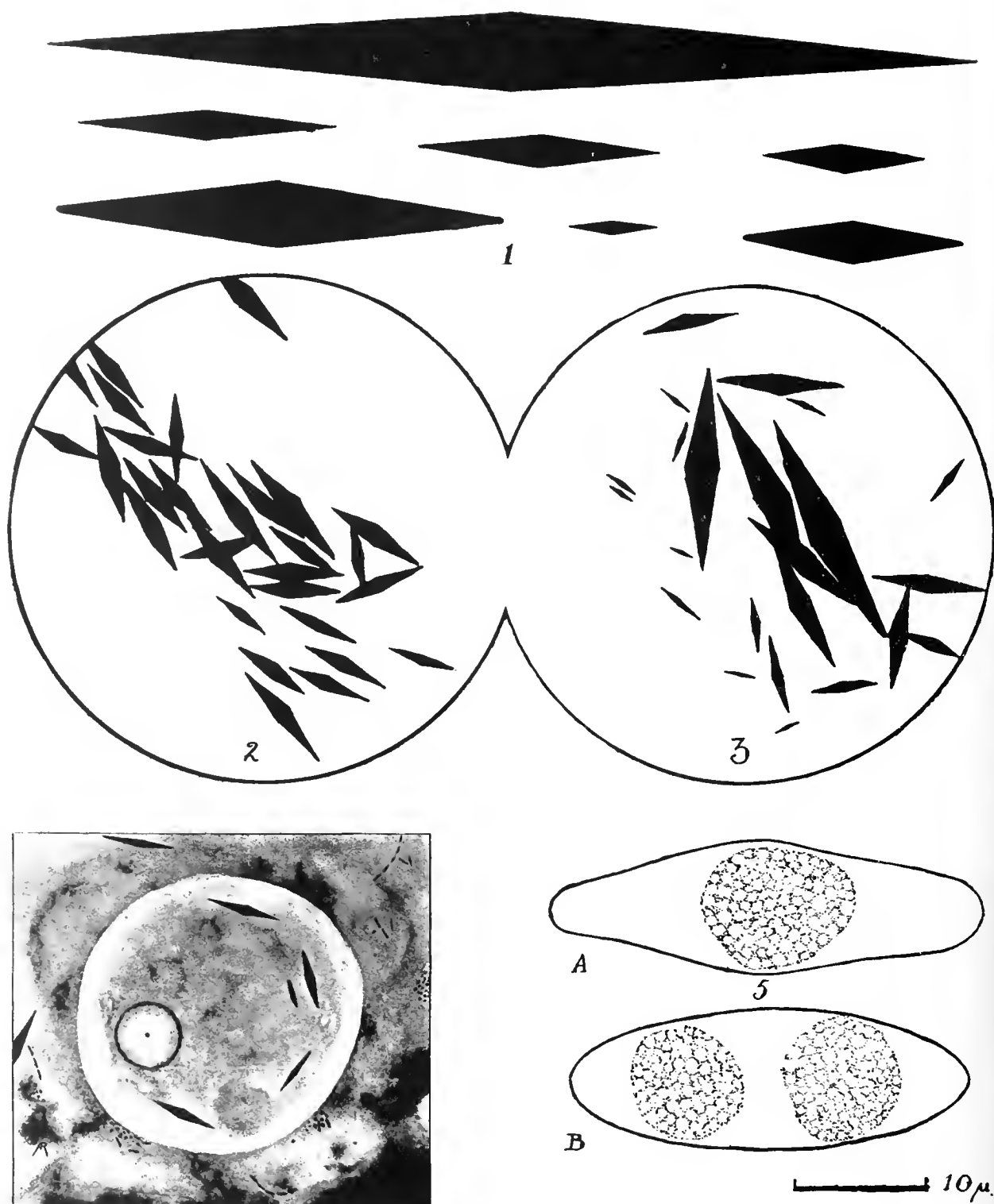
FIG. 4.



FIG. 5.

0 10 20 μ

PLATE II.



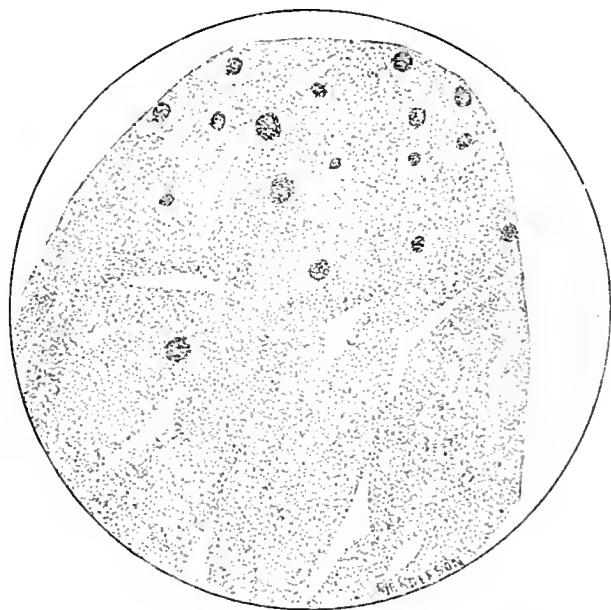
J. G. T. et A. R. del.

4

To illustrate "Charcot-Leydon Crystals in the Stools as an Aid to the Diagnosis of Entamœbic Dysentery,"
by JOHN GORDON THOMSON, M.B., Ch.B., and ANDREW ROBERTSON, M.B., Ch.B.

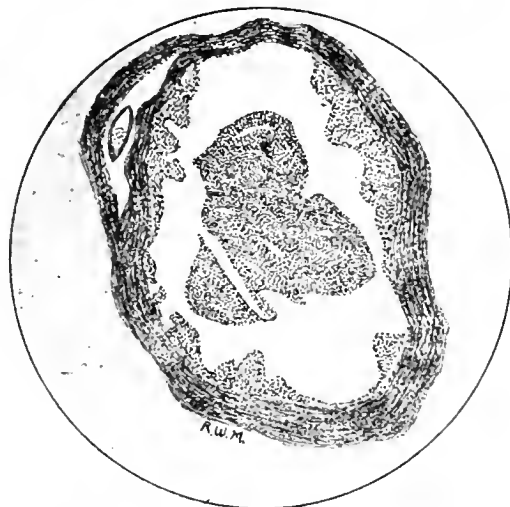
filled the partly collapsed vesicles, but in general leucocytic infiltration was slight. In still other areas the capillaries were dilated and there was hyaline thickening of the vesicular walls, making the spaces smaller, but not entirely obliterating them. Some of

The bronchi in guinea-pigs present an interesting picture on first inspection, but what at first looks like a pathologic condition is found to be a normal state in the guinea-pig. Some of the bronchi show a pecu-



Cross Section of Lung showing Mycotic Tumour Masses,

these affected areas were in proximity to bronchi, others not. External to a few of them there was an exudate of cells and fibrin or red cells on the pleura, or the pleura was thickened by cellular new tissue.



Pulmonary Mycosis in Guinea-pigs. Peribronchial Lymphnode

liar papillary condition that partly fills the lumina consisting of long and very narrow stalks of fibrous tissue, springing from a thick basement membrane and covered with epithelial cells.

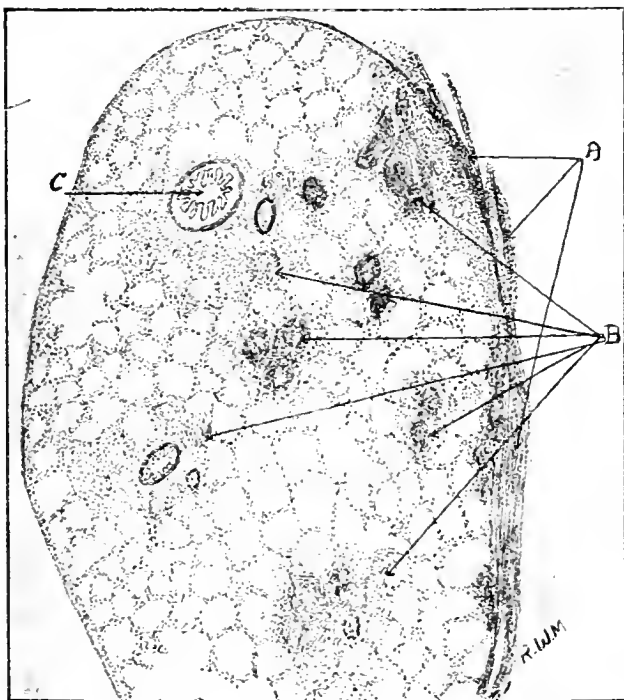
Sections from the enlarged peribronchial lymph-nodes show the capsule greatly thickened by new and cellular fibrous tissue, the interior being a mass of polynuclear leucocytes which only partly fill the space enclosed by the capsule. The appearance is that of pus cavities from which the fluid has been extracted, leaving only the leucocytes.

The mycelial element of the original monilia could not be demonstrated, but conidia were present in many of these areas.

The diagnosis: Bilateral mycotic bronchopneumonia, subacute bronchitis, peribronchial lymphadenitis.

The control pigs were negative.

I have at present other guinea-pigs infected with the same and other species of monilia recovered from human cases of broncho-pulmonary mycosis . . . under observation for a longer period of time than one month . . . and up to the present they are to all appearances in normal health. Two monkeys infected are seemingly quite well. It is possible that these animals, especially the monkeys, have a natural immunity to mould infection to the extent of successfully combating any ill effects. As all animal life here is subject to a more or less continuous damp and mycotic-laden atmosphere, it would seem reasonable to think that a certain immunity would be developed. Certainly the pathological picture is quite different from that of tuberculosis of the lungs, in which case it is usually a degenerating and breaking-down of the tissues, while in a mycotic infection just the opposite predominates, there being a marked tendency, from the very beginning, to build



Pulmonary Mycosis in Guinea-pigs (Composite low power Drawing).

up and form new tissue, even to the extent of producing fibrous tissue tumours.

From a public health point of view, pulmonary mycosis, first described by Castellani, is of great importance and only differs from tuberculosis in degree. It is contracted in the same way, milk infection excluded. It is incapable of being prevented. It is to a greater degree amenable to medicinal treatment and it should receive the same careful attention other pulmonary infections do.

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CASTELLANI, DOUGLAS and THOMPSON (1921). *JOURNAL OF TROPICAL MEDICINE AND HYGIENE*, vol. xxiv, No. 11. June.

Notes on Treatment of some Cases of Schistosomiasis (Surg. Commander A. A. Sanders, O.B.E., and Surg. Lieut.-Commander J. L. Priston, M.B., *Journal of the Royal Naval Medical Service*, vol. vii, No. 4, October, 1921).—Three mild cases of clinically diagnosed schistosomiasis received symptomatic treatment only and recovered rapidly; all are in apparently good health six months after infection.

Three moderately severe cases in whom ova were found received 24½ grm. of N.A.B. Live miracidia were hatched from two of these cases, in one case twelve weeks and in the other five weeks after the last injection. The first of these is in apparently good health in spite of the presence of live ova. The other two were not much better after the course than before, and received further antimony treatment.

The above two cases and one other severe case each received from 21 to 24½ gr. of antimony tartrate intravenously. In each case the number of ova excreted was much diminished, and those found after the course all appeared to be dead.

The severe case was strikingly improved in health and weight, and the other two are in good health but still below their original weight.

In all the cases, however treated, the eosinophilia has decreased fairly steadily throughout, and no particular kind of treatment seems to affect the disease markedly.

Treatment of Relapsing Fever with Neosalvarsan (F. Lorentz, *Ztschr. f. Hyg. u. Infektionskr.*, vol. xc, 1920).—The author describes an outbreak of relapsing fever which occurred in Roumania in 1917. Details are given of the treatment of cases by salvarsan, the chemical characters of the drug, and its possible mode of action. The dose necessary in the treatment is 0.6 grm.; this cuts short the disease in most cases, but its curative value depends on the reciprocal action of its antispirilla property and that of the antibodies produced by the host.

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THE JOURNAL OF

Tropical Medicine and Hygiene

NOVEMBER 15, 1921.

SURGEON MAJOR-GENERAL SIR GEORGE JOSEPH HAMILTON EVATT, K.C.B., C.B.

A GREAT man has passed from amongst us, one of the greatest of our profession. An Army surgeon, who joined the Army whilst yet the Regimental Surgeon was in being in the Army;

when there was no Army Medical Staff Corps, no R.A.M.C., and the foremost duty of the Army surgeon was to make a good Mess President. He served in many parts of the Empire and took part in many campaigns. That he did in common with other officers of the Service, and did it well. Fighting, however, he despised and hated as keenly and more genuinely perhaps than any who are now engaged in the "no-more-war" conference now being held in Washington, U.S.A.

From the year 1866, when he joined the King's Own Scottish Borderers, until the day of his death in the second week in November, 1921, he devoted himself to raising the status, improving the knowledge, the discipline, and the *esprit de corps* of the branch of the Army service he belonged to. He early appreciated the humiliating position the Army doctor held whilst serving in the Army. His commission gave him a relative rank only, he was in the Army, but not of it. He was a unit merely attached to a regiment; the private soldier saluted him if he chose to do so, there was no punishment for his not doing so. He could not give an order to a soldier and insist on being obeyed; the soldier, if he carried it out, did so if it suited his convenience to do so, and out of regard to "Dr." Evatt as a doctor, not as an officer of the Crown. If a soldier in hospital behaved in a disorderly or disgraceful manner the Regimental Surgeon had no power to arrest him, but he had, however senior in the Service, to call in a young Lieutenant or Ensign, a boy, to officially arrest the soldier for his conduct.

The chaos that prevailed in the military hospital at Scutari in 1854 during the Crimean War was due to the want of the power of the doctor to command. No soldier was in duty bound to obey, be he an orderly or a patient in bed, and the men did as they pleased, not even saluting their medical officer. The doctor could not officially report the soldier to the officer commanding the regiment. The doctor had to request the company-sergeant-major to report the man's bad conduct to the officer of his company, and hence in turn to the O.C. But the sergeant-major did as he pleased about reporting the man; he was not bound to do it because the regimental surgeon asked him to do so. Anomalies and degradations were heaped upon the office of the Army surgeon of that day, and thereby upon the members of the profession of medicine generally, not only in military but in civil life. For it must be remembered that the Army surgeon was in the Army brought into social contact with the "class" officer at a time when the Army officer was admitted not by examination but by nomination and favour. "Younger sons" were found a ready place and a "country job," and they resented doctors being regarded as belonging to "our class." They had, in fact, some justification, for the social recruiting ground for doctors was all too often faulty; the life of the medical student of the 'fifties and later was not to be admired; when any rowdy lot of young men came in contact with

the police in a rather disgraceful fashion, they were generally stamped as medical students by the public press, or assumed to be by the public themselves. Suddenly brought from cheap lodgings in or about Soho, "the Borough," or the Old Kent Road in London, the "altoun" in Edinburgh or the purlieus of Dublin, where manners at table were not observed, to say the least of it, the poor man was not "at home" at mess amongst lads of high-class families, brought up at English public schools, or universities, where the dining hall and its rules and regulations and etiquette were in being, and something of a fetish; it is no wonder that the "class" doctor did not stand high amongst men to whom social position, and perhaps that alone, was the one reason for their being in the Army at all.

Medicine was, moreover, at a low ebb in the middle of last century compared with the high standard of to-day. Listerism had not been introduced; bacteriology was not; the microscope was but in the swaddling habilitment stage of its being; pathology but a seedling. There was not much in medicine to elevate or to admire nor to cause the young doctor to hold his head up as a representative of a profession whose foundations were neither sure nor worthy even of being called a branch of science. This was the position of the Army surgeon when Evatt joined the Service, and he resented it keenly. He felt the indignities cast upon the doctor in the Army; and he set out to remove the ignominy of it all as his life's work. Even in the 'sixties, shortly after joining the Army, he dreamt a prophetic dream, one in which he saw a great medical military service, organized, disciplined, equipped at all points scientifically, steeped in the modern hygiene of Surgeon Parkes, the founder of modern sanitation, from knowledge acquired in the camp and on the battlefield, where Moses acquired his. The knowledge gained by both Moses and Parkes extended to all the earth, and civilians as well as the military were eternally benefited.

General Sir George Evatt was ahead of time; he forestalled the calendar, and his ideas in these early days were treated as those of an idealist, and his theories as those of a visionary. He himself was regarded with contempt on account of his ideas, and regarded as one that deserved crucifixion. The writer has himself seen a letter to him in the 'eighties dictated from high quarters, telling him that he was laying himself open to arrest and dismissal unless he stopped his practices and attacks upon the systems in vogue in military and civil life.

The writer's first acquaintance with Major Evatt was in 1883 whilst he was in medical charge at Woolwich of the military cadets. He was sent to me by Mr. Andrew Maclure, then a sergeant in the London Scottish Volunteers (now Major Maclure (retired)), who had taken up the idea of training regimental stretcher-bearers in the Volunteer Army in the 'seventies. Maclure had his training class in 1883, when he asked the writer to give the first-aid lectures to his pupils.

The writer, after grasping Maclure's idea for the private, set to work to organize classes for the medical students, the future medical officers of the Volunteer battalions. The start was made at Charing Cross Hospital in the spring of 1883, and the movement soon spread to the medical schools of London. In the early days of this development a card was handed to the writer from Surgeon-Major George Evatt, the Military Academy, Woolwich. He said that he was sent by Mr. Maclure, who told him that a man with his (Evatt's) idea had already initiated the work at Charing Cross Hospital. A lifelong friendship was established between men of kindred spirits and with the same ideals. They advocated the formation of a medical corps for the Volunteer Army on the same lines as that existing in the Regular Army. They visited and addressed the medical students in practically every medical school in England, Scotland and Ireland, and succeeded in establishing there Medical Staff Corps units from amongst the medical students, choosing these men because they would be the future officers of the units when the Government (if they did so) saw their way to enrol them as part and parcel of the Volunteer Army. Both men incurred heavy outlays of money and great expenditure of energy and time in this campaign; printing, travelling, interviews with authorities, expenses of halls for meetings, came hard on the pay of a Surgeon-Major in the Army and upon a Demonstrator of Anatomy in a London dissecting room. On April 1, 1885, their efforts were rewarded, for there appeared in the *Gazette* the announcement that the formation of a Volunteer Medical Staff Corps had passed both Houses of Parliament and had been established by the War Office. Thus ended one of what Evatt regarded as the greatest works of his life; and he was able now to turn his attention to other things.

He was a rigid abstainer from alcohol and tobacco in order to set an example to the soldier. He lectured after he came to England on many platforms, and rejoiced to be able to state in later years that there were 40,000 abstainers in the Army; that, in fact, half of the 80,000 men that left these shores when war broke out in 1914 were teetotalers. Hygiene was ever a topic on which he dwelt, and it was owing to his advocacy that the British soldier was granted three undervests for his kit.

Before this two undervests only were supplied, one worn whilst the other was at the wash. If, however, from any reason the one he was wearing was fouled in any way or was wet from the weather or excess of perspiration, there was no prospect of changing it until the following week's washing came to hand. With another undervest added the fouled undervest he had on could be replaced, and thereby the comfort and the health of the soldiers improved. It was, however, to hospital organization and hospital discipline that he devoted much of his thoughts towards his later years in the Army. The writer witnessed Evatt's "plan of campaign" in 1900 at Quetta. Here some 400 cases of enteric

were gathered from the neighbourhood, chiefly from the Punjab and the North-West Province and Beluchistan. Many, of course, in the convalescent stages. Evatt's Hospital gave evidence of what might be termed disciplinary hygiene "*in excelsis*." Finger boards were everywhere in and out of the hospital. "To the Lavatory," "To the Recreation Room," "To the Operating Theatre," "To the Bath," "To the Dispensary," and so forth. All the internal economy of the hospital was dealt with in a manner which, although usual in military hospitals, was brought to a state of microscopic exactitude. The effect upon the officers under his command was either irritation or worship of the man and his methods. Amongst the latter was Hayward R. Whitehead, now Surgeon-General Sir Hayward R. Whitehead, K.C.B., F.R.C.S. (retired), whose appreciation of Evatt and his methods was unbounded.

Almost all the men in high position in A.M.S. to-day were followers of Evatt in their methods, and by the example this great teacher set them have brought the R.A.M.C. to be an example to many non-medical departments of the Army to their great advantage.

Sir George went to Hong-Kong, whither he carried his ideas and thoroughness of methods. It was here that he practised a fine piece of "Evattism." Not quite satisfied with the discipline of the wards in the military hospital, and wishing to see how the visiting medical officer handled his work, Evatt put on his pyjamas and got into a bed in one of the wards. From his bed he watched the medical officer and the medical orderlies as they went round the ward seeing the patients, and laid there until they came to where the Surgeon-General lay. Evatt then read them a lesson concerning the discipline of the ward, the behaviour of the officer himself, the nurses, the orderlies, and even the patients' behaviour as regards saluting, speaking to their medical officer, &c.

It is doubtful if ever any Army medical officer had taken this method of testing the ward-work in the hospital under his charge.

When in Hong-Kong, Surgeon-General Evatt came in contact with the Colonial Medical Service for the first time. He watched the method of the working of this service and inquired into its organization. He was astounded to find it to consist of broken units with no co-relation, to be wanting in discipline, that entrance to the service was not regulated by examination but by nomination; that there was no grading in the service; that the pay in many instances was beggarly; that promotion and leave regulations were haphazard, and that in many Crown colonies, the West Indies more especially, a man with a family was a prisoner for life, as he could not on his pay take a holiday. Pensions were in a state of chaos, and the whole system was calculated to discourage good men to join the service.

Sir George in a well-considered paper drew up an outline, stating what was required to improve the

service: a complete set of titles for grading, a scale of pay and pension which should be applied universally, a scheme for study leave and holidays, and a course of instruction necessary before a medical officer took up practice in the tropics.

No notice was taken of this valuable paper until it was read at a meeting in 1898, when Mr. Cantlie proposed the formation of a School of Tropical Medicine in London for medical men going to the tropics to take up work there. A petition was signed at this meeting, and the scheme was forwarded by the chairman of the meeting, Sir Joseph Fayrer, to Mr. Joseph Chamberlain, then Minister for the Colonies. The petition for the formation of a Tropical School was supported by Mr. Chamberlain and by Sir Patrick Manson, and carried through. It was really Sir George Evatt that published in 1896 the first idea of a School of Tropical Medicine in the country.

To give a complete sketch of Evatt's work in the space at the writer's disposal is impossible. His inquiries into many branches of medical organization were most thorough, and his suggestions for remedial action most interesting, full of common-sense, and reasoned out in every detail. Especially may be mentioned the Poor Law Medical Officers of Ireland service. The subject of Temperance in the Army; of provision for the Blind; for the Nursing Profession; and many other points of public interest were dealt with, improved and illuminated by his wise brain and humanitarian impulses. When 73 years of age he took up in a practical way the investigation of the lunacy laws and the treatment of lunatics in public asylums. He did this by joining the medical staff of one of the largest medical asylums near London. He served as the "junior" medical officer of the staff, and was treated as the junior officer of the staff usually is. The result of the hard work he had to do, and the many times he had to climb the stairs of the asylum in the course of the day was the cause of his death. His heart gave out, and he never recovered from the strain. Herculean as he was in frame and strength the work was beyond even his power, and he succumbed, a sacrifice to conscientious endeavour in the public cause. A great loss to the country was the fact that he did not live to give us his experiences and his conclusions from close observation of the modern plan of dealing with the insane.

His work and ideas were always in advance of the times, and he was looked upon as a dreamer, a man of impossible ideas and conceptions, by his acquaintances and the public at large in his young and active days. It may be truly said of his early

days that he was a man "of whom the world was not worthy." In his advanced years his worth was discovered, for his ideas had fructified, and all he urged for the good of the Army had been adopted. He was followed to the grave by his friends with the same greeting in their hearts as he will be received with in the next world: "Well done, good and faithful servant."

JAMES CANTLIE.

Abstracts and Reprints.

BRONCHOMONILIASIS COMPLICATING PULMONARY TUBERCULOSIS IN A NATIVE OF THE GOLD COAST, WEST AFRICA.¹

By J. W. S. MACFIE and A. INGRAM.

SINCE Castellani discovered the condition in Ceylon in 1905, bronchomoniliasis has been identified in many parts of the world, especially in tropical and subtropical countries. In Africa, Chalmers and Macdonald (1920) studied a number of cases in the Soudan and Egypt, and Pijper (1917) has noted the presence of the disease in South Africa, but, so far as we are able to ascertain, no cases have hitherto been recorded from West Africa. For this reason, a short account will be given of a case which has recently come under our notice at Accra, in the Gold Coast, West Africa. The case was not a pure bronchomoniliasis, but occurred in a patient suffering from pulmonary tuberculosis, a form of mixed infection which apparently is not uncommon, and has been observed previously by de Mello and Fernandes, Castellani and Chalmers, and others.

History.—We are indebted to Dr. J. R. Moffatt for the following history of the case. I. D., a native (Buzaburme), aged about 25 years, and a member of the Police Force, admitted to the Native Hospital, Accra, on September 29, 1920. The patient stated that he had suffered severely from cough for at least two months previous to admission. Upon being closely questioned, he further admitted that for at least eighteen months he had experienced attacks of illness, accompanied by cough, at irregular intervals. Physical examination revealed dullness at the apex of the right lung, chiefly supra-clavicular; at the base of the left lung there was a considerable area of dullness extending as high as the angle of the scapula, and at its upper portion, especially on the anterior aspect, bounded by a hyper-resonant area. The cough was frequent and harassing; the sputum copious and in appearance like thin flour paste. Sweating was inconsiderable. Although the breathing was rapid the patient never suffered from dyspnoea. The temperature chart kept whilst the patient was in hospital showed an irregular fever

¹ Abstracted from *Annals of Tropical Medicine and Parasitology*, vol. xv, No. 1, April, 1921.

similar to that which might have been expected in a case of pulmonary tuberculosis. The treatment given was cod-liver oil, and, for a few days only, potassium iodide. During the last two weeks of his illness the patient showed some improvement and gained weight; on the night of November 8, however, he had a sudden and copious hæmoptysis and died within an hour.

A specimen of the sputum of this case was forwarded to the laboratory for examination as to the presence of tubercle bacilli, on September 30; none were found on this occasion, but it was noted that the sputum had a curious appearance, suggestive of saliva containing small particles of macerated bread, and accordingly another specimen was asked for which should be taken after thoroughly washing the mouth with a weak antiseptic solution. On October 2, the second specimen of the sputum was examined, and was found to contain numerous yeast-like (*Monilia* sp.) but no tubercle bacilli. Cultures were made from this specimen of the sputum upon Sabouraud's maltose agar and glucose agar, and within twenty-four hours a copious creamy-white growth of the monilia had made its appearance on both media. On October 5, the sputum again showed yeast-like monilia cells and also a few coarse hyphæ; tubercle bacilli were not detected. As potassium iodide has proved a valuable remedy in bronchomoniliasis, it was suggested that it should be tried in this case, and this was done for a few days, 10 gr. being given thrice daily. The effect was to reduce the number of monilia cells in the sputum very greatly, and to reveal the presence of tubercle bacilli which in all probability had been overlooked at previous examinations. A specimen of the sputum examined on October 8 showed very numerous tubercle bacilli and no monilia cells, and as the potassium iodide appeared to be causing the patient some discomfort, owing to the increase in the quantity of his sputum, it was then stopped. Sputum examined on October 14, and later, showed that the monilia cells had reappeared and that the number of tubercle bacilli appeared to be fewer. The patient died on November 8 as the result of an hæmoptysis, and a post-mortem examination of the body was made on the following morning.

Post-mortem Examination.—The following were the notes made at the examination. Body: that of a young native man, rather emaciated. Abdominal cavity and its contents appeared to be normal. Spleen: not enlarged, weight $7\frac{1}{2}$ oz., no visible morbid condition. Kidneys and liver showed venous engorgement but no other pathological signs. Gall-bladder: collapsed, empty. Mesenteric glands not enlarged. Right lung adherent to the chest wall at its apex; on removal and section a cavity about the size of a walnut was found at the apex, it contained a blood clot; the whole of the upper lobe and a portion of the middle studded with small tubercles. Left lung: completely collapsed, visceral and parietal pleura very greatly thickened and of a creamy-yellow colour; the pleura covered in parts

with a deposit of the colour and consistence of cream cheese, the pleural cavity contained about 4 oz. of turbid straw-coloured fluid; the substance of the lung studded with numerous caseating tubercular nodules, and at one point apparently communicating with the pleural cavity. Lymphatic glands at the root of the neck and in the mediastina: enlarged, tuberculous.

Smears of the creamy exudate in the left pleural cavity showed numerous tubercle bacilli and yeast-like monilia cells, also a considerable number of short septate branching hyphæ. Sections of the lungs showed that both were the seat of advanced tubercular disease; sections of the thickened pleura of the left lung and of a mass of pleural exudate showed also the presence of monilia.

Organism.—The monilia found in this case was easily obtained in pure culture by inoculating tubes of Sabouraud's maltose agar and glucose agar. It was Gram-positive but not acid fast. It grew well on most solid media, but especially well on glucose agar, and produced rapidly a diffuse, spreading, creamy-white growth. Under anaerobic conditions its growth was slower. Gelatin and blood serum were not liquefied by it, and did not become pigmented. In broth and peptone water it caused a white deposit to be thrown down while the media themselves remained clear; in peptone water a slight surface pellicle was formed. It produced a thick white growth on potato. On solid media the growth was almost entirely composed of yeast-like cells; in some fluid media hyphæ predominated.

Its qualitative bio-chemical reactions may be tabulated as follows:—

Arabinose	...	O	Inulin	...	...	O
Rhamnose (isodulcitol)	...	O	Amygdalin	...	...	O
Galactose	...	AG	Helicin	...	...	O
Glucose	...	AG	Phlorrhizin	...	...	O
Levulose	...	AGs	Salicin	...	...	O
Mannose	...	O	Glycerol	...	...	O
Lactose	...	O	Erythrol	...	...	O
Maltose	...	AGs	Adonitol	...	...	O
Saccharose	...	AG	Dulcitol	...	...	O
Amylum	...	O	Inosite	...	...	O
Dextrin	...	O	Mannitol	...	...	O
Glycogen	...	O	Sorbitol	...	...	O

The symbols representing: A = acid; G = gas; s = slight; and O = neither acid or gas.

The production of gas in levulose and maltose was slight. If the cultures were kept for two weeks or longer the acidity produced in the five sugary media indicated tended to be superseded by alkalinity; this was earliest seen and most pronounced in glucose and saccharose. At first no change was produced in litmus milk, but later, after about ten days, alkalinity developed; no clot was formed and the medium was neither decolorized nor peptonized. Indol was not produced in peptone water.

As gas was produced in glucose, levulose, maltose, galactose and saccharose, the organism comes into the fifth group of species of *Monilia*, called the *Tropicalis* group, according to the classification of Castellani and Chalmers (1919). In this group are placed (*loc. cit.* p. 1084) *M. tropicalis*, Cast.,

M. paratropicalis, Cast., *M. pulmonalis*, Cast., *M. nivea*, Cast., *M. insolita*, Cast., and *M. enterica*, Cast.; but from the table given by the same authors (pp. 1082-1083) it would appear that *M. faecalis* Cast., and *M. metatropicalis*, Cast., should also be included. A somewhat later table given by Castellani (1920) differs slightly from that given by Castellani and Chalmers and omits certain species whilst introducing some additional ones. According to it acid and gas are produced in the five sugary media mentioned by five species only, namely, *M. enterica*, *M. faecalis*, *M. metatropicalis*, *M. paratropicalis*, and *M. tropicalis*.

Reverting to the species given by Castellani and Chalmers, which include the five given by Castellani alone and three others, it will be seen that the bio-chemical reactions of the organism isolated from our case do not agree entirely with those of any of them. The reaction in litmus milk suffices to distinguish it from all the other species of the *Tropicalis* group excepting *M. enterica* and *M. nivea*. The former of these two produces slight acidity in mannitol and dextrin, reactions which are not produced by our species. As regards the latter, *M. nivea*, acid and gas are produced in raffinose, and acid but only a small amount of gas in saccharose. We were unable to test the reaction of our species in raffinose, but in saccharose much gas was produced, and only a small amount in levulose and maltose. It is admitted, however, that many of the species of the genus *Monilia* have not permanent bio-chemical reactions, a point emphasized by Castellani himself, and if they are liable to vary outside the body, it seems not unlikely that they may vary also according to their host. The very slight differences noted between the bio-chemical reactions of the organism recently isolated by us and those of *M. nivea* are, therefore, probably unimportant.

M. nivea was originally found in sputum, and is considered by Castellani and Chalmers to be of doubtful pathogenicity. It is of interest, therefore, to recall that the organism resembling this species which we have isolated was found not only in the sputum but also, after death, in the body of the patient.

SUMMARY.

A case is recorded in which bronchomoniliasis complicated pulmonary tuberculosis in a native of the Gold Coast at Accra.

The patient died of an hæmoptysis whilst under observation. At the post-mortem examination both lungs were found to be tuberculous. The left lung was collapsed, and the pleural cavity partially filled with exudate. In this exudate and in the thickened pleura over the lung monilia was present.

The organism, which belonged to the *Tropicalis* group of Castellani and Chalmers, closely resembled in bio-chemical reactions *M. nivea*, Cast. (1910); without raffinose we are unable to state whether the species found at Accra is distinct from *M. nivea*, Cast.

GLYCOSURIA OF MALARIAL ORIGIN.

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AND

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MALARIA may simulate very many internal diseases, but we are not aware of cases of malarial glycosuria and malarial diabetes having been placed on record; the following two cases may therefore be of some interest.

Case 1.—J. F. S., a demobilized soldier, aged 32, was admitted to the Tropical Section of Orpington Hospital on April 13, 1921, as a case of malaria. He had his first attack in August, 1916, when malignant tertian parasites were found; since then he had had numerous relapses. On admission the temperature was 98·8° F., and the pulse 120; the patient was pale and tremulous; he stated that he had lost flesh and complained of great weakness. Physical examination of the chest revealed nothing worthy of note. The spleen was not palpable. No malarial parasites were present in the blood. Differential count: Polymorphonuclears 63, large mononuclears 9, lymphocytes 33, eosinophiles 1. In the faeces no cysts were found. The chemical analysis, kindly carried out by Dr. Lynch at the Central Chemical Laboratory, Ministry of Pensions, Chelsea, gave the following results:—

Total solids, 22·1 per cent.			
Fat	...	...	8·6 per cent.
Fatty acid	...	...	2·8 "
Soaps (as fatty acid)	...	...	2·8 "
Total	...	...	14·2 per cent.

The urine, specific gravity 1031, was slightly acid, the amount passed during twenty-four hours was only very slightly increased. It contained sugar 8·5 gm. per litre, but no albumin. Acetone and diacetic acid were absent.

On April 14 the patient was placed on a fairly intensive quinine treatment (10 gr. three times daily). The sugar present in the urine decreased rapidly after twelve days' treatment, but there was still a quantity sufficient to reduce Fehling's solution and to give phenyl-glucosazone crystals, though not enough to estimate. The patient was then given, in addition, a course of six injections of quinine hydrochloride intramuscularly of 15 gr. each. On May 10 the quinine hydrochloride injections were discontinued, and quinidine was given in their place (30 gr. daily).

The urine was examined again on May 13, 16, 17 and 18, and did not give any reduction of Fehling's solution, nor did it give phenyl-glucosazone crystals.

At no time was the patient put on antidiabetic diet, and there was no restriction of his carbohydrate intake. There can be little doubt, therefore, that

the disappearance of the sugar was due to the administration of quinine.

When the patient was admitted to hospital he was feeling very weak, and complained of having lost a great deal of flesh. There was, however, no polyuria, no boulimia, no thirst. On May 20, 1921, the general appearance of the patient had much improved, and he expressed himself as feeling better than he had done for years.

Case 2.—Mr. E. N., aged 44, married, with no family history of diabetes, consulted one of us in March this year. During the war he served in one of the allied armies, and in 1916 he contracted, while in the Balkans, a severe malarial infection; he had several relapses, the last being on December 19, 1920. In January, 1921, he noticed that he was feeling more hungry and thirsty than usual, was passing much more urine than normal, and was losing flesh. He consulted a medical man, who found a fairly large amount of glucose in the urine (2 per cent.), and placed him on a very strict diet, which induced only a slight decrease in the amount of sugar present in the urine. When the patient consulted one of us in February the urine contained 1.5 per cent. of glucose; it was acid, specific gravity 1032, no albumin, and acetone and diacetic acid were absent. The amount of urine passed during the twenty-four hours averaged six pints.

The patient looked rather emaciated and very anæmic; the skin was of a pale, earthy colour, with patches of hyperpigmentation resembling chloasma, so often seen in cases of chronic malaria. His spleen was very slightly palpable and very hard. The examination of the blood did not show any malarial parasites, but there could not be any doubt clinically that he had chronic malaria, and the diagnosis was made of "diabetes in a malarial subject." He was advised to continue the strict diet he had been having for the glycosuria, and in addition to take 10 gr. of quinine three times daily for his malaria. He came back three weeks later feeling much better; the enlargement of the spleen had disappeared, and—a most interesting feature—the amount of sugar had decreased enormously, being less than 0.1 per cent. We came to the conclusion that it might be a diabetes syndrome of malarial origin, and suggested to the patient that he should go back to ordinary diet but continue the quinine. He came to see us regularly once a week and the sugar did not increase; only a trace was present. During March the patient went to the South of Europe on business, and during all the time he was away (four weeks) did not take any quinine. He came back to this country in April, and three days after arrival, after playing golf in the rain, had a shivering fit, followed by very high fever, which ended in profuse sweating. The spleen again became palpable and hard, and examination of the blood showed the presence of a few rings of malignant tertian. The urine was examined after the temperature had come down to normal; it contained 1.2 per cent. of sugar. The patient was placed on an intensive quinine treatment by the

mouth and intramuscular injections for six weeks without any dieting; not only did the symptoms of the chronic malarial infection disappear, but the urine became completely free from glucose, when examined by the usual methods of analysis (Fehling's, Nylander, phenyl-hydrazine, fermentation test).

CONCLUSION.

Our observations tend to show that there is a form of glycosuria of malarial origin, and that this condition may at times (Case No. 2) become so severe as to simulate true diabetes, the patient losing flesh, becoming very weak, complaining of thirst and hunger, and passing a large amount of saccharine urine. The glycosuria in our two cases was cured by the administration of quinine in full doses without any dietetic treatment.

Medical News.

Finlay Park and Monument, Habana.—A park has been constructed opposite the headquarters of the National Public Health Service in Habana, and has been named after Dr. Carlos J. Finlay, a statue of whom has been placed in the centre of the park.



Finlay Monument in Habana.

Finlay's pioneer work on the mosquito transmission of yellow fever is well known.

By the kindness of Professor Hoffmann, of Habana, we are able to give a photograph of the monument.

Original Communications.

A NOTE ON THE ARNETH COUNT IN MALARIA AND DYSENTERY.

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AND

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SINCE Arneth in 1904 first described the changes he had noted in the nuclei of the polymorphonuclear leucocytes occurring in certain infectious diseases, the estimation of these changes known as the Arneth count has been undertaken in a number of cases of disease of the most varying character, and often with contradictory results.

The one disease in which most workers are agreed as to its value is tuberculosis, in which, at any rate, in the more acute forms of the disease, there appears to be a more or less constant shift to the left, with a gradual movement in the direction of a right shift as the disease improves or tends to become quiescent.

Although a great many observations have been made on the Arneth count in tuberculosis, few records exist as to the picture in so-called tropical diseases.

In an excellent paper by Treadgold (*Lancet*, March 27, 1920), he stated that Knapf has found a shift to the right in dysentery (type not stated) and in ankylostomiasis, and also quotes Chamberlain and Vedder, &c., as showing that there is a shift to the left among healthy whites in tropical countries, though McFie interprets this as due to abortive inoculation with malarial parasites.

Breinel, in his investigations on the Arneth count in children in Queensland infested with ankylostomiasis, showed that there is a marked shift to the left in that disease.

THE NORMAL COUNT.

Arneth gave as his original normal count for 100 cells:—

Class 1	...	...	...	5
„ 2	...	...	...	35
„ 3	...	...	...	41
„ 4	...	...	...	17
„ 5	...	...	...	2

giving a total number of lobes of 276.

Von Bernsdorff gives as his normal count for 100 cells in man:—

Class 1	...	...	...	0.8
„ 2	...	...	...	38.4
„ 3	...	...	...	40.2
„ 4	...	...	...	12.4
„ 5	...	...	...	1.0

or a total of 260 lobes in all.

Seeing that these two authorities differ as to the normal count in healthy men to an appreciable extent, we felt that it was better to determine our

own normal standard, seeing that the personal factor largely enters into the determination of the class into which any particular cell should be placed.

For this purpose we selected six apparently healthy men who had never suffered from any serious disease, whether tropical or otherwise, and each of us counted 100 neutrophile cells in each instance, finally taking the mean of our two figures.

On this basis we found that the proportions of the different classes worked out as follows:—

Class 1	between 1 and 12
„ 2	38 „ 51
„ 3	35 „ 47
„ 4	5 „ 13
„ 5	0 „ 3

and giving a variation in the total number of lobes in 100 cells as between 240 and 276. Only one patient of the series gave a count as high as 276, whilst the other five varied between 240 and 253.

We therefore fixed our normal as between 240 and 260 as being approximately correct.

METHOD OF DOING COUNT.

Most authorities who have worked at the Arneth count in various pathological conditions have been content to do such counts at varying periods of time and various stages of the disease. It appeared to us that more exact inferences might be drawn from results obtained by doing daily estimations of the index. Accordingly this was done, with the exception that Sundays were omitted. It was our custom for each of us to count 100 cells quite independently of each other and on separate films and to average the results. It would seem that doing this would be likely to give us more accurate results than if a smaller number of cells were counted.

OUR CASES.

It is unfortunate that we are only able to record results in a very few cases of tropical disease, our patients consisting of:—

Five	...	Benign tertian malaria.
One	...	Subtertian malaria.
Four	...	Amœbic dysentery.

In the cases of malaria all the cases had parasites in the blood, whilst in the amœbic dysentery cases the *E. histolytica* was demonstrated in either the faeces or from scrapings of ulcers obtained by means of the sigmoidoscope.

THE CHARTS.

In studying the charts (1—5) illustrating the results of the Arneth count in cases of infection with benign tertian malaria, it will be noticed that in Cases 1, 4, 5 the count shows a certain degree of left shift at the beginning of the investigation, followed by a rapid shift towards the normal in the course of a few days. This appears to coincide

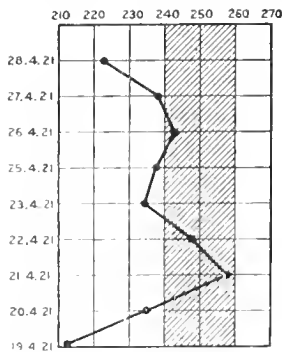


CHART 1.—Benign Tertian Malaria.

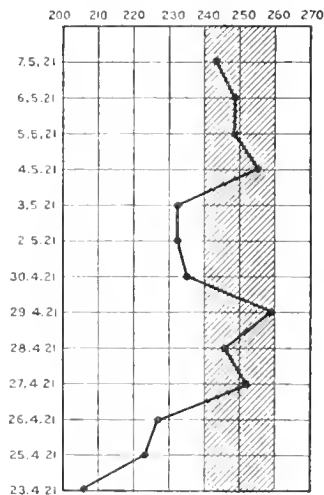


CHART 4.—Benign Tertian Malaria.

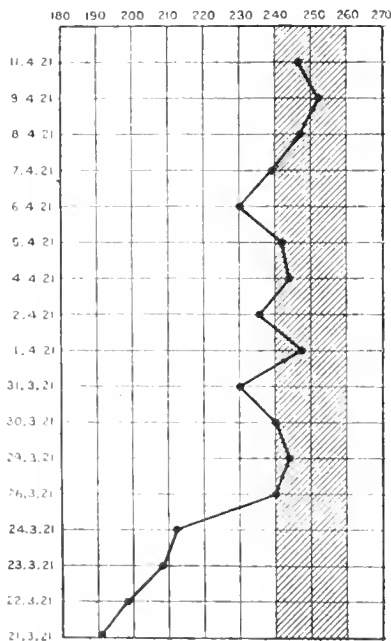


CHART 6.—Subtertian Malaria.

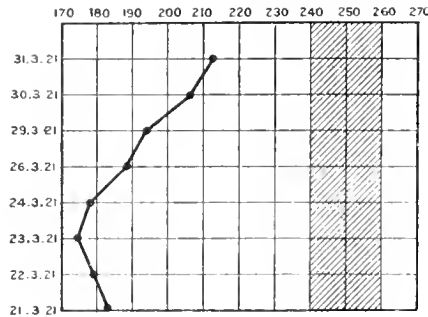


CHART 2.—Benign Tertian Malaria.

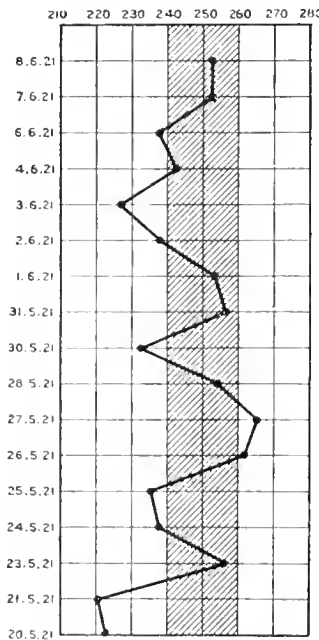


CHART 5.—Benign Tertian Malaria.

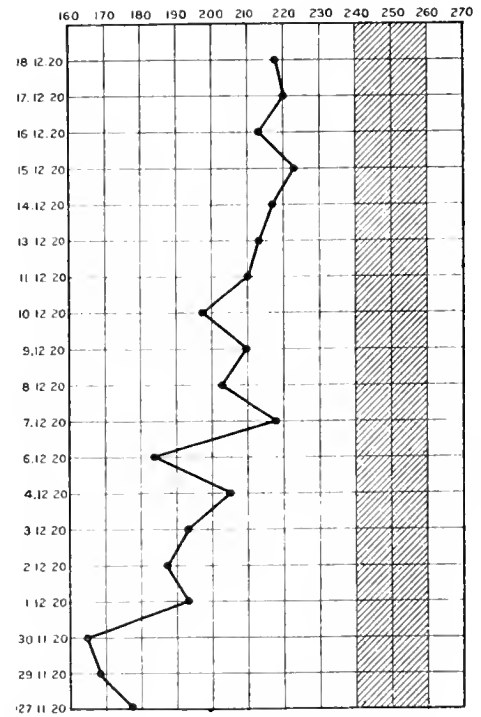


CHART 3.—Benign Tertian Malaria.

with the administration of quinine, which was started within twenty-four hours of their admission to hospital.

As soon as the patient came under the influence of quinine and the parasites were banished from the peripheral circulation a marked improvement tending to the normal rapidly set in.

In cases 2 and 5 (*vide* charts) much the same obtains. The count at the onset shows a marked left shift, but under treatment a marked steady tendency to shift to the right is observed, though in these cases the count did not reach the normal whilst the patients were under observation.

Chart 6 illustrates a case of subtertian malaria. Much the same condition is observed as in the cases of benign tertian. First a decided left shift and then a marked improvement to the right under the influence of quinine.

Charts 7 to 10 are cases of infection with *E. histolytica*. It will be observed that infection with this parasite causes practically no appreciable deviation from normal in the Arneth picture.

We are fully aware that investigations of such a small number of cases affords very little basis for drawing conclusions, but as far as our work has gone it appears to show:—

(1) That infection with *E. histolytica* causes no change of any moment in the Arneth picture.

(2) That cases of malaria before treatment show a more or less definite shift to the left, but this rapidly gives way to a shift towards the normal as soon as the patient is vigorously treated with quinine, and the general toxæmia is thus eliminated.

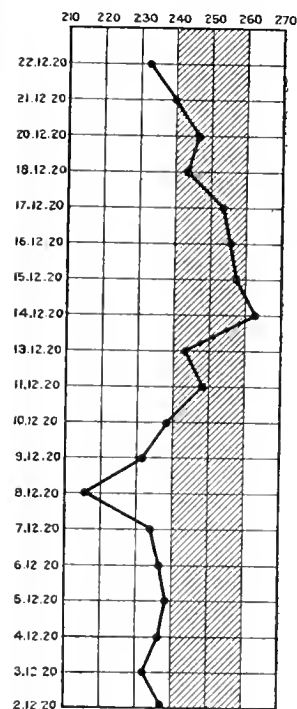


CHART 7.—Amœbic Dysentery.

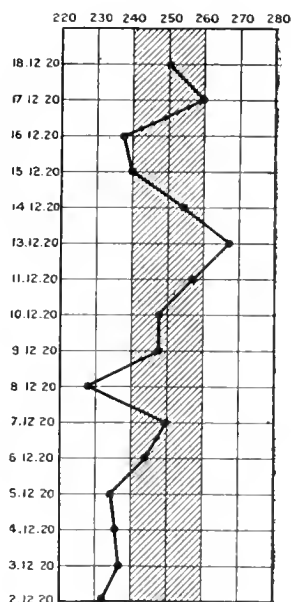


CHART 8.—Amœbic Dysentery.

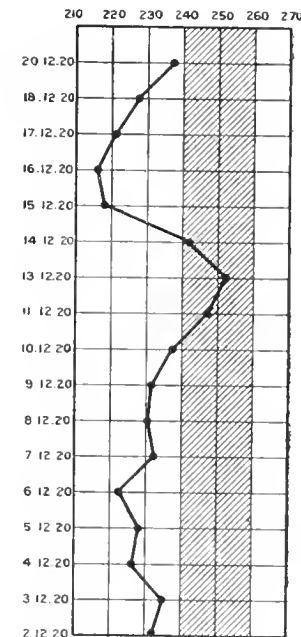


CHART 9.—Amœbic Dysentery.

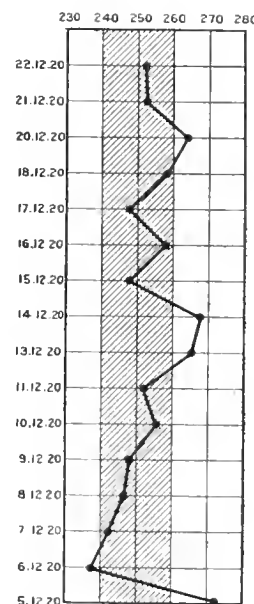


CHART 10.—Amœbic Dysentery

DHOBIE ITCH PRODUCED BY INOCULATING A CULTURE OF *EPIDERMOPHYTON RUBRUM* (CASTELLANI 1909).

By RICHARD DE SILVA.

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THREE species of *Epidermophyton* and one of *Trichophyton* have been isolated from patients suffering with a condition clinically known as *Tinea cruris* (*T. inguinalis*) or Dhobie itch. These are *Epidermophyton cruris* (Castellani), *E. perneti* (Castellani), *E. rubrum* Castellani, and *Trichophyton nodiformans* Castellani, respectively.

There are no references in the literature of the experimental production of the disease by inoculating with a culture. Sabouraud and Castellani have reported that they have failed to produce the disease, using cultures of *E. cruris*. Recently I isolated *E. rubrum* from a case of Dhobie itch, and one of my confrères kindly allowed me to rub a portion of a culture into the skin of his arm after it had been superficially scarified.

After a week he developed a typical patch of ringworm (Dhobie itch) at the site of inoculation, and from this site cultures were taken and *E. rubrum* was isolated.

The following are the cultural characters of the fungus used for the inoculation:—

Sabouraud's Maltose Agar.—The growth appears in five to seven days after inoculation, and has a white powdery spreading margin and slowly develops a red centre.

Glucose Agar.—(First subculture from the original tube.) Growth appears in five days after inoculation as a white knob slowly spreading all over the medium. Red pigmentation develops gradually throughout the growth. Thus the full-grown culture is of a deep red colour, covered by a white duvet.

Maltose Agar (three weeks old).—Whitish. Powdery and centrally umbilicated.

Glycerine Agar.—There is a thick central growth, which is surrounded by a spreading thin film of growth, which at its margins has a faint green tint.

Nutrient Agar.—Grows well. Some of the colonies appear to invade the medium.

Sabouraud's Broth.—A white pellicle appears which slowly becomes a deep red.

Peptone Water.—A white pellicle is formed and no pigment appears.

From the above characters it will be seen that the fungus is *E. rubrum* Castellani, which differs from *E. perneti* Castellani by the slow growth on Sabouraud's agar, and by having a deep red pigmentation instead of the very delicate pink colour which is characteristic of the latter.

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SOME OBSERVATIONS ON THE MEDICAL SITUATION IN WEST, CENTRAL AND SOUTH AFRICA.

By HENRY S. HOLLENBECK, M.A., M.D.

It was my privilege to be a member of the Phelps-Stokes Commission which was sent out to make a survey of conditions affecting the education and general welfare of the natives in Africa, and which, during the twelve months ending August 1, 1921, visited British West Africa, Liberia, Cameroon, Belgian Congo, Portuguese West and South Africa. To me was assigned the task of observing the sanitary and hygienic conditions, together with provisions for medical relief. A brief report of the results may be of general interest, and I pass them on for what they are worth.

In the colonies visited and in the native sections of South Africa, a striking feature of the situation is the utter inadequacy of the medical force for the work that urgently needs to be done, whether looked at from the point of view of numbers or from that of equipment. The number of fully equipped hospitals is small, and the staff is often inadequate for the few so equipped. In many areas scientific medical assistance is immediately available to but a small part of the European population, and quite generally to a surprisingly small part of the native population. This means that the native population is dependent upon the native medicine men, the irregularities and abuses of whose practice do not require comment here. Suffice it to say in passing that there is in general little evidence of any tendency toward progress on their part. This presents to the medical profession a very needy field where there are to be some very important developments in the future. At present both Missions and Governments are experiencing difficulty in obtaining medical men for the service.

There are a number of significant factors in the present situation which are of vital concern to the native populations. First of all there is a lack of facilities for training a native medical force capable of dealing with the local diseases. Good training is being furnished here and there for a few natives, but there is no general effort in this direction, and there is no school for the training of properly qualified native medical practitioners.

The objections to such training which are sometimes raised, on the ground of the abuses which are known to have resulted from advanced training in the past, may be offset by means of proper control and supervision. It is a proper field for co-operation between the Missions, which have a direct interest in such large numbers of natives and the Governments in control, and, to begin with, special licences might be arranged. Plans are under way looking to the establishment of suitable schools, and in view of their very obvious importance to the natives, it seems that they should receive the hearty approval and support of the medical profession, instead of opposition, as has occurred in individual cases in the past. In support of this contention is

the very high death-rate which prevails quite generally. It is so high that in various places it is an open question whether or not the population is decreasing, apart from sleeping sickness areas where it is known to be decreasing. In this connection it should be remembered that very often an increasing population is an important factor in improving sanitary conditions.

There is a strikingly high death-rate from preventable diseases, such as malaria, hookworm, dysentery, small-pox, surgical conditions, typhus in South Africa, &c., though there are no general statistics to show the relative importance of these diseases. Malaria continues to be the leading causative factor in the mortality lists, and in all the tropical colonies accounts for a large per cent. of the excessively high infant mortality which quite commonly reaches 500 per 1,000. In the effort to reduce malaria the anti-mosquito measures have often failed to achieve the expected result. The clearing away of bush and the removal of supposed sources of mosquitoes sometimes had but limited effect in reducing the numbers of mosquitoes. These discouraging results may in some cases have been due to a failure to locate the principal source and suggest further study of the situation. An effort to eradicate malaria by treatment of the whole population in Dar-es-Salaam proved a failure. In dealing with malaria then, prophylaxis directed at the organism or direct attack on it must continue to be the main reliance for the present.

In certain localities the hookworm assumed a highly important rôle in the health of the natives, while a high per cent. of infection prevails throughout the tropical colonies. It was frequently estimated at from 80 to 90 per cent. by the men on the field, and one doctor working in the Cameroon, and having many post-mortems to do in connection with labour camps, found 100 per cent. infected, the infection usually being slight.

If the native population is to increase the question of infant mortality is one of prime importance, and in addition to the problem of disease there is that of proper care, which often comes to be the more important consideration. Some of the methods employed by mothers in the care and feeding of infants, in their ignorance and in the pursuit of harmful customs, are amazing, and must of necessity often have disastrous results. In the case of prolonged or exhausting illness it is absolutely essential that there be some other form of nourishment available than those ordinarily in use, and this opens up the whole question of diet which concerns adults as well as children. It is probable that the very low vitality of some native peoples is due in part to faulty diet. The popular food varies greatly from district to district, and in many cases, if not in most, it does not fulfil the requirements of a complete diet. Some light was thrown on this phase of the subject by an experience in the Johannesburg mines. It was found that, in spite of a carefully arranged diet with a view to providing anti-scorbutics, a considerable number of cases of

scurvy developed. Investigation showed that they all came from one district, and a visit to the district revealed the fact that there had been a partial crop failure and the people had been living on short rations. When the men came to the mines they showed no effects, and there was no evidence of scurvy, but the unusual occupation and the extra strain tended to produce scurvy in spite of an adequate diet. In view of the fact that partial famine is a frequent occurrence, and of the further fact of the widespread condition of an annual shortage of food at certain seasons, the importance of the whole question of food supply and its culture is self-evident. It should be emphasized in the teaching of natives, and an effort should be made to introduce more variety of food products and improved methods of cultivation.

Owing to the decline in the use of prophylactic quinine and the frequent statements met with that the doctors disagree as to its utility, special inquiry was made as to belief in its efficiency. Thirty-five medical men, including English, French, Belgian, German and American practitioners in the colonies visited, were asked their opinions as to the use of prophylactic quinine by Europeans. Thirty-two of them believed it useful, mentioning the conditions, three were doubtful, but no one considered it useless. The conditions were that it be properly taken and that the ordinary preventive measures from the bites of mosquitoes be carried out. Its highest efficiency was generally considered to be for those staying for short periods in malarious districts. Careful observers on the West Coast, the Congo and elsewhere are convinced of its general utility in malarious districts where there is exposure to the bites of mosquitoes. The usual method recommended is 5 gr. a day, preferably in the evening, but some consider it better to say 1 gr. per 15 kilograms of body weight. In non-malarious districts, or where it is possible to avoid mosquito bites, quinine is of course not required. This point does not seem to have been made sufficiently clear in all cases. It is noticeable that in some places where there has been a decrease in the use of prophylactic quinine, there has been an increase in severe cases of malaria and of cases of blackwater as well.

Sleeping sickness occupies a position of considerable importance in various colonies, but its chief significance is in the Congo, where it is far from being under control. Large sections are acutely affected by it, and it still appears to be spreading to new areas. The measures which are being taken to deal with it are entirely inadequate, a much larger medical staff being required than is available.

It was reassuring to see European children thriving in various parts of the colonies, as it shows the possibility of family life on the part of those called upon to serve in the colonies, thus adding to the attractiveness and comfort of the service. It also makes it seem likely that much more territory is open to European residents than is commonly supposed.

CONCLUSIONS.

- (1) A larger medical staff is urgently needed.
- (2) Much larger numbers of native assistants should be trained.
- (3) More attention should be given to the teaching of hygiene and sanitation in the schools.
- (4) Attention should be given to the improving of the food supply.
- (5) Provision should be made for the local training of qualified native medical men.

A Fungus of the Genus Nocardia Cultivated from Heart Blood (J. W. S. Macfie and A. Ingram, *Annals of Tropical Medicine and Parasitology*, vol. xiv, No. 3, September, 1921).—The fungus isolated was cultivated from blood withdrawn from the heart at the autopsy on a patient who died at Accra of an obscure complaint. A guinea-pig inoculated with an emulsion of a culture appeared to be unaffected. The organism showed the characters of a fungus of the genus *Nocardia*, but so far as the author has been able to ascertain, does not correspond with any of the numerous species already described. Although it was obtained in cultures made from blood aspirated from the heart, it is not possible to say if the organism is pathogenic to man, but the fact that its growth was almost restricted to potato and media containing either blood serum or ascitic fluid is perhaps significant. The name proposed for this fungus is *Nocardia cruoris*.

Spirochætosis in Poultry in the Doukkala District, Morocco (P. Delanoe, *Bull. Soc. Path. Exot.*, June 1921).—The author records the occurrence of spirochætosis in fowls, ducks and geese in the Doukkala district. The disease may be either acute, ending in death, or chronic, causing paralysis of the lower limbs, or there is a benign form with a more or less complete absence of symptoms. The carrier is *Argas persicus*, Esch., and it is very abundant in all fowl houses, especially in the summer months.

Staining the Spirochæta Pallida by the Fontana-Tribondeau Method (Cesar Fuentes, M.D., *Archives of Dermatology and Syphilology*, vol. iv, No. 4, October, 1921).—Burnt alcohol fixation is not necessary, but is, on the contrary, rather harmful to the morphology of *Spirochæta pallida*. Ruge's solution is sufficient for fixation and dehemoglobinization. This solution can, however, be substituted by H₂O₂, one-third in water, and 1 c.c. formaldehyde, making a volume of 100 c.c.

Heat is not essential in order that the tannin may act as a mordant. Fontana's solution may act without heating. The best way to use the method consists in heating tannin until it steams, and applying silver nitrate for one or two minutes. The most typical forms of spirochæte are seen when the method is applied cold.

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THE JOURNAL OF

Tropical Medicine and Hygiene

DECEMBER 1, 1921.

ADDRESS OF THE CHAIRMAN, PROFESSOR A. ALCOCK, C.I.E., F.R.S., AT THE ANNUAL DINNER OF THE LONDON SCHOOL OF TROPICAL MEDICINE.

In proposing the pious toast of our school, I would remind you that last year—which by a curious chance was its twenty-first—was a turning-

point in its history, and therefore, I think, we might do worse than take it as a point from which to look back upon some of the more interesting events of its early days, so as to keep alive the memory of what good men have done for it in the past, and thereby find inspiration for the future.

No one here need be reminded that the idea of this school originated in the great mind of Sir Patrick Manson, whose extraordinary originality had been revealed to the world long before, when, working for his daily bread amid all the obstructions of a general practice, and far from any academic influence or suggestion, he discovered and marked out those new and wide domains of pathology and preventive medicine of which the school is one of the results.

But the fine idea might perhaps have been sterile had it not happily been imparted to a man of vision—that great Secretary for the Colonies, Mr. Joseph Chamberlain—who at once grasped its full significance.

And even then it might not have struck root and borne fruit so quickly if it had not found a fitting place in the heart of the Seamen's Hospital Society. The haunts of the merchant seamen are not usually associated with academic pursuits, and I have often been asked what identity of interest exists between a hospital for seamen and a school of tropical medicine. It needs but a moment's thought to see that in the scheme of the British Empire the two things go naturally together.

For it is a truism that the crowded millions of these islands live not on the firm foundation of the native farmer and the native plough, but more precariously by the ships and the sailors that bring them most of their food and raw material from overseas. So that if you help the sailor and mitigate the hazards of his calling, you help to strengthen the precarious foundations of our national existence. And what better help can you give to the sailor than healthy ports in those rich and populous tropical possessions where so much of our trade lies?

Besides, there are sentimental reasons for putting the sailor and the tutelary deity of tropical medicine in the same picture. Who can think of our immortal Drake, the founder of our sea-power, cut off in the full vigour of life, in that disastrous epidemic of dysentery in the Mosquito Gulf; or of our incomparable Nelson, invalided home, and not expected to recover from the effects of his two years' service on the East Indies station, without feeling deeply what tropical disease, and therefore tropical medicine, may mean for the destinies of England?

Whether we are informed by interest or by sentiment, we find Britain as a first-class power relying entirely on the sailor, and the sailor and the trader, for whom the sailor works, relying considerably on a healthy development of the tropics. And it is to the everlasting credit of the Seamen's Hospital Society, not so much that they realized these truths—for these truths must be among their elementary business convictions—but that they set their seal upon them by their instant and generous response to the great design of Manson and Chamberlain.

So the school was established among the seamen at the Albert Dock, with Sir Patrick Manson at its head, the Seamen's Hospital Society at its back, and the Secretary of that Society working like one of Nature's silent, patient, persistent, constructive forces in every part of it, and there for twenty years it grew and flourished, nourished by numerous benefactions, many of which were attracted through the influence of Mr. Joseph Chamberlain and his son. And I doubt if the nation, or even the medical profession, realizes what it owes to the Seamen's Hospital Society for its courage and enterprise in taking up this great educational experiment.

During those years over 2,000 medical men went through its course—men of almost every race and nation from China to Peru, men from all the great medical services, medical missionaries of both sexes, medical officers of plantations, railways, and other industrial concerns, many private practitioners. Our course was practical, both in the large amount of objective laboratory work, and in keeping the laboratory as much as possible in touch with the wards of the hospital. So practical was it—so well was the mirror held up to Nature—that it has at times happened that foreigners having (like Nerissa) but a poor pennyworth in English, have worked through it with complete satisfaction to themselves, so that we have often come very near realizing what Gulliver witnessed at the Grand Academy of Lagado, where the most advanced philosophers, despising speech for its ambiguities, imparted their ideas solely by exhibiting the concrete objects of their thoughts.

During those years we also kept in vital communion with the tropics, and seventeen expeditions were sent to different parts of the world to study various problems of tropical disease.

We must not talk about, though we cannot entirely forget, the vicissitudes that must befall every human institution in the course of twenty mutable years.

Our first serious trouble was when, in the fulness of time, Sir Patrick Manson had to give up active participation in our work. What that meant cannot be told. Sir Patrick was the Patriarch, the Pontifex maximus of tropical medicine. "*Grande decus columnæ rerum.*" While he was at work among us we felt that the eyes of the world were upon us. Wise men came from the East and the West to pay him homage and to leave a blessing on his school; when he left us we lost the lofty and imposing prestige of an oracle.

We suffered another very severe loss some years later when Dr. C. W. Daniels was compelled by ill-health to leave us. Daniels, though he did not wear his heart upon his sleeve or study the arts of the courtier, was one man picked out of ten thousand; in digested experience, in insight, in breadth of outlook, and in solid worth and judgment, he was fit to sit with Manson in the gate. When he left us we lost a bulwark.

These were heavy moral and spiritual losses; and if such losses can ever be recompensed by material

gains, then in our twenty years we received—as an unforeseen issue of the war—such an accession of fortune as might comfort the materialist.

You know how, during the war, the sturdy merchant sailor, going on his lawful occasions without much concern for himself, though he gaped on every side of him, quietly put his heel on the blond beast theory of creation. You know how the Societies of the Red Cross and St. John of Jerusalem, in admiration of his courage and in recompense for his dreadful sufferings, endowed him with the very appropriate gift of a hospital in Endsleigh Gardens. You know how the Seamen's Hospital Society brought the school from the docks to the new hospital, and how, through the personal interest of Lord Milner and the liberality of London merchants, this move was accomplished.

So in our eventful twenty-first year we came out of our nursery at the docks into the full light and searching atmosphere of one of the academic quarters of London, and from this new position we now look forward to the future.

We trust that in the altered atmosphere of the Hospital for Tropical Diseases we shall never lose the healthy complexion we acquired at the Seamen's Hospital as a school. Under Manson and the men of experience whom he gathered around him at the docks the school soon acquired a world-wide reputation as a place where a medical man could fit himself at all essential points for dealing with the special features of tropical disease, either in the way of diagnosis and treatment or of original research; and I cannot conceive how the school can better justify its existence before gods and men than by maintaining, and if possible increasing, its reputation in this great educational mission for making the tropics as healthy as Western Europe. If I knew a stronger word than "*mission*" I would use it, for I know in my own heart the enormous difference in outlook between a man who goes to his work in the tropics through our school and a man who never had that chance.

But in one branch of our work we show a deficiency exactly where, from our connection with an important adjunct of the mercantile marine, we ought to show a conspicuous excellence, and that is tropical hygiene. We cannot continue in the front rank; we shall not fulfil the expectations that have been formed of us, if we do not provide in that subject a special course full enough and practical enough for the man who intends to take up preventive medicine in the tropics. We are all aware of our shortcomings in this respect, and are prepared to rectify them, but the money is wanting.

We trust also that in our new hospital we shall never cease to look upon the tropics, where Manson and Bruce and Ross made their famous and fruitful discoveries, as the natural and proper place for studying the causation and effects of the tropical diseases; but not by costly and ostentatious expeditions. Such expeditions have had their day. They were necessary at the outset to awaken public attention at home, and to stimulate local effort

abroad. But now that influential men at home are fully alive to the matter; now that institutes for medical research have sprung up in so many tropical colonies; and now that a stream of men well trained for the purpose—in our own school more than anywhere else—is steadily flowing to the tropics; these overwhelming expeditions from home are likely to do more harm than good by disparaging and discrediting those local efforts which it is so necessary to encourage and support and extend. A better policy for us now is to co-operate with the local tropical institutes and to develop a common interest with some of them, by providing that one or other of our permanent staff should always be working at and with one or other of them; in this way we should always have a root in the tropics, and some of the local institutes might profit by frequent intercourse with us.

There is, however, one branch of research which, for climatic among other reasons, can be better done here than in the tropics. It is a recent and most promising development of medicine that we have not yet touched—namely, the application of biochemistry to the study of tropical pathology. It is a study of such enormous possibilities that, whether you regard it from the scientific standpoint, as promising to raise the sciences of pathology and therapeutics to an altogether higher level; or whether from the practical point of view, as affecting the welfare of the patient, you may justly say that any school such as our own, which does not provide for it, must soon fall behind modern academic standards. But here again, though we all understand our duty, we cannot do it for want of a little money.

Thus, although we have been brought into a fine large house in London, and have broad phylacteries of large gold letters across our upper garments, we have to walk abroad delicately lest we reveal the existence of two large holes in our nether garments, and shamefully expose our nakedness in hygiene and biochemistry.

Then again, by removal to our new domicile, we have left behind at the docks our mess and all its social amenities. If this were a mere mortification of the flesh it might perhaps be a blessing, but it is an intellectual deprivation—an educational deprivation; for if, as Carlyle said, men who have nothing else in common can always find comfort and counsel in dining together, how much more will they benefit if they can sit at meat together, or smoke their pipes together and compare and discuss varied professional experiences from all parts of the world.

Apart from these material defects, which can, and no doubt will, be put right by a little money, the school, like almost everything else nowadays, has at last come to suffer from the fitful fever known as "reorganization," and the fashionable craze known as "co-ordination." From these complaints money will not save us; from these complaints we shall hardly recover until the educational theorist understands—what every biologist knows—that the too-nicely-contrived organization only comes to grief by the burden and friction of its own

elaborate devices; and that co-ordination, far from being a newly-discovered process for working a ship without a captain, is merely a more precise term for that easy specialized central professional administration which is the first requisite for unity, concord and success.

When these eternal biological truths are understood, I hope it will come to pass that our school will be administered, in everything outside its strict financial basis, not by a distracting multiplicity of mixed committees and sub-committees, but by a single medical council directly responsible to the Board of Management.

But I must not burden my song with any more wants and deficiencies, especially as we have to give thanks for several mercies.

To begin with, our numbers, which had touched low water mark during the war, have now again reached their old high water mark, and our staff has been enriched by new talent tempered by long tropical experience.

Then we have lately come into closer touch with that other great "missionary" enterprise for propagating the knowledge and promoting the study of tropical medicine and hygiene—the Tropical Diseases Bureau.

Then again, thanks to the more than common kindness of the Air Ministry, we have been able to make a start with a field laboratory for the study of medical entomology at the Halton Air Camp. And for this hospitable assistance we are particularly indebted to Air-Commodore Fell, Air-Commodore Scarlett, and that incomparable officer, Wing-Commander Turner.

Last, we have been able, by the kindness of many friends—among whom Mr. Henry Wellcome must be specially mentioned—to obtain for the school a portrait which does something like justice to our benign, venerable, and illustrious founder, Sir Patrick Manson.

The name of Manson will always be a spiritual influence and motive to all who have had the honour of working with him, and in this portrait that influence will be enshrined for the inspiration of future generations.

If in proposing this toast I have said too much of our shortcomings and too little of our accomplishments, it is because as a member of the staff I feel that to talk too much of what we have done is to forget that

"To have done is to hang
Quite out of fashion, like a rusty mail
In monumental mockery,"

and that to rest satisfied with achievements is to lose sight of the fact that to-day, even more than in the times pictured by Shakespeare,

"Emulation hath a thousand sons
That one by one pursue. If you give way
Or hedge aside from the direct forthright
Like to an enter'd tide they all rush by
And leave you hindmost."

The sociable claims of an annual reunion quite reasonably interdict too much formal speech-making, or the speaker might have enlarged on two points at least. In speaking of the school's unavoidable losses—*annorum series et fuga temporum*—he would have liked to refer to them all, and particularly to Sir James Cantlie and Professor W. J. Simpson, two of Sir Patrick Manson's earliest associates in the enterprise, who retired this year after twenty-two years of yeoman's service in the cause of the school which they had helped to establish in public confidence. They will always live in their former colleagues' hearts, and their names are honourably remembered by more than two thousand former students spread all round the globe, between Cancer and Capricorn. He would also have liked to explain at length that in expressing the opinion that special expeditions had had their day, he was referring to the ordinary conditions of tropical countries administered by a well-organized medical service.

Annotations.

A Note on Relapsing Fever in India (F. W. Craig, *Indian Journal of Medical Research*, 1920, pp. 29-34).—The author has noticed that in the United Provinces epidemics of recurrent fever seem to occur chiefly in the hottest part of the year, namely, March, April and May. It is therefore considered unlikely that lice (*Pediculus*) are the transmitting agents in these epidemics. Brown has suggested a pentatomid bug, *Bagrada pieta*, as a possible agent. Apparently distinct forms of the disease occur, and this being the case, a form which proves to be transmitted otherwise than by the louse will have to be regarded as a separate entity in spite of clinical similarity, and the apparent identity of the organism.

The Malaria Danger (E. W. Ferguson, *Medical Journal of Australia*, May, 1921).—The author states that there are five different species of anopheles in Australia—*A. annulipes*, Walk., *A. atratipes*, Skuse, *A. stigmatius*, Skuse, *A. corethroides*, Theo., and *A. barbirostris*, Wulp, var. *bancrofti*, Giles. The two latter have not been recorded as yet in New South Wales but they occur in southern Queensland. The most common is the *A. annulipes*, whose range extends all over Australia including New South Wales. The development of endemic malaria in Australia following the return of infected troops is not thought probable owing to the relative scantiness of mosquitoes in urban districts and the scattered population in country areas. Ross calculates that one-quarter of anophelines succeed in biting human beings and only a third of these survive a week, and only a

quarter of the remainder succeed in biting a second time. Hence only one in forty-eight is ever likely to give infection.

Air Carriage of Pathogenic and other Organisms (J. B. Buxton, F.R.C.V.S., D.V.H., and H. R. Allen, M.R.C.V.S., *Journal of Hygiene*, vol. xx, No. 2, October, 1921).—The authors have come to the conclusion that given favourable conditions, such as a direct current of air through a building, organisms derived from animals, their fodder or environment, may be disseminated over distances up to 150 ft. from the building. *Bacillus welchii* is frequently present in the dust and dirt of buildings in which horses and small laboratory animals (guinea-pigs and rabbits) are housed. Under suitable conditions, spore-bearing anaerobes such as *B. welchii*, may be carried with infected dust from such buildings for a distance of at least 90 ft., and probably considerably farther.

Notes on a Cutaneous Reaction for the Possible Diagnosis of Enteric Group Carriers (Captain T. O. Thompson, *Journal of the Royal Army Medical Corps*, vol. xxxvii, No. 4, October, 1921).—An attempt has been made by a series of experiments and records throughout the year to ascertain if any reliable cutaneous reaction is given by enteric group carriers, after the manner of a von Pirquet reaction. The method used was as follows: Three platinum loopfuls of the following substances were placed on the forearm, the skin of which was thoroughly cleansed with spirit; an area of about one inch in diameter was scarified through the liquid and then allowed to dry, no dressing being applied.

The three substances used at first were: (a) Sterilized normal saline as a control; (b) a mixed high-titre serum of *Bacillus typhosus*, para A and para B; (c) a mixed killed culture of *B. typhosus*, para A and para B, of about 200 millions per cubic centimetre. After a short time the ordinary T.A.B. vaccine was substituted for this.

The reactions and findings of this experiment, taken as a whole, are apparently reliable and satisfactory, but the numbers available were very small, and it would be interesting to see the results of a much larger number for corroboration.

The experiment appears to offer an easy and quick method for the detection of enteric group carriers, and possibly of diagnosis in the late stages of the disease, by the use of separate cultures of *B. typhosus*, para A and para B; this point, however, requires further testing on a number of cases. The test should prove valuable, when thoroughly corroborated, in finding the carrier source of sporadic outbreaks of enteric group fevers in any community, either military or civil, since all possible human sources can readily be tested and suspicious cases ear-marked for further investigation. It should simplify the examination of the kitchen staff of any

establishment either prior to engagement or during routine examinations. It should also be a considerable help in enteric and other convalescent depots for the rapid detection of enteric group carriers and the early return of non-carriers to their own units, especially during the urgent demands of active service.

The Toxigenic Features of Stains of the Diphtheria Bacillus isolated from Horses and from a Mule (G. F. Petrie, M.D., *Journal of Hygiene*, vol. xx, No. 2, October, 1921). Experiments were made in 1920 by Capt. F. C. Minett, R.A., V.C., with diphtheria bacilli isolated from eleven horses and a mule. Six of the cultures were sent to the author for examination. Capt. Minett is of the same opinion as Cobbett, i.e., that horse diphtheria is of practical importance in relation to the public health and that the occurrence of the disease in horses throws light on the comparative frequency of "normal" antitoxin in their blood.

The discovery of the diphtheria bacillus in superficial septic lesions in the horse apart from specific infection of the nasal mucosa is paralleled by recent observations on the human subject. Thus, there is growing evidence that in man the *B. diphtheria* is apt to be associated with a variety of chronic skin lesions or may become implanted upon cutaneous or subcutaneous lesions already affected with pyogenic bacteria, for example, war wounds and friction sores. Martin (1917) isolated virulent diphtheria bacilli from sores of this kind which were refractory to the usual methods of treatment. It is significant that they occurred in men of the Australian Light Horse. Similar observations were made afterwards by others in Egypt and Palestine.

Capt. Minett's observations suggest that reciprocal contagion of horse and human diphtheria happens more frequently than has hitherto been suspected. Inquiries undertaken with this probability in mind when the circumstances of infection are obscure, may lead to the detection and prevention of cases of diphtheric infection, and may indicate effective treatment with antitoxic serum.

An Experimental Study of the Intracranial Parasitism of the Human Lung Fluke, Paragonimus Westernmanii (Sadamu Yokogawa and Susumu Suyemori, *American Journal of Hygiene*, vol. i, No. 1, January, 1921).—Immature specimens of *P. westernmanii* which have been developing for varying periods of time in other animals do not migrate into the cranial cavity of dogs when introduced into wounds in the sides of their necks. Young distomes newly emerged from their cysts do not penetrate into the cranial cavity when introduced into the orbits of dogs, but in some cases make their way into the pleural cavity. Young distomes which have just escaped from their cysts when injected into the common carotid of dogs under conditions which preclude the possibility of

their not being carried into the cranial cavity are never found in the cranium, but in several cases are encountered in the pleural cavity.

When specimens of *P. westernmanii*, both larvæ and adults, are introduced directly into the cranial cavity of dogs, by trephining the skull, only one out of about a hundred are generally found in the cranial cavity, but a number are usually met with in the lungs or pleural cavity. The course which these worms follow from the cranial cavity to the lungs and pleural cavity is probably by way of the cerebral sinuses, the internal jugular veins and the pulmonary arteries. That the cranial cavity is an unfavourable location for the development of *P. westernmanii* is suggested by the relative infrequency of cerebral paragonimiasis in man, the finding of a worm in this location showing retardation in development, and by the rapidity with which the worms introduced into the cranium migrate from this location.

An analysis of the human cases of cerebral paragonimiasis indicates that in the great majority the pathological changes are produced by the entrance of partly grown or adult worms through the foramina at the base of the skull, and their subsequent invasion of the brain tissue, and not by emboli composed of eggs.

The Influence of Chemicals upon the Chemotaxis of Leucocytes in Vitro (Elizabeth P. Wolf, *Journal of Experimental Medicine*, vol. xxxiv, No. 4, October, 1921).—Wright's method for the study of chemotaxis of leucocytes *in vitro*, slightly modified, has been found to be most satisfactory in the estimation of the degree of chemotaxis of various substances, because it is possible to make an exact quantitative determination of the leucocytes that have migrated from the blood clot and adhere to the surfaces containing the tested substance.

The calcium ion is the only inorganic ion *per se* which was found to be positively chemotactic under the conditions of these experiments. It is markedly chemotactic in all concentrations and in all combinations, except the citrate. Here the negative chemotaxis of the citrate ion neutralizes the positive chemotaxis of the calcium ion, and neutrality of chemotactic effect results.

The sodium and magnesium ions themselves are neutral. Magnesium and sodium salts are dependent upon the negative ion with which the magnesium or sodium is combined for such positive or negative chemotaxis as is exhibited. All the phosphates of sodium, whether tri-, di-, or monobasic salts, are markedly positively chemotactic, and when combined with other reagents which are themselves neutral or negatively chemotactic, produced marked positive chemotaxis. The blood of a person who has taken phosphates either by mouth or intravenously shows a great increase in chemotaxis with sodium phosphate, with calcium chloride, and even with sodium chloride which is ordinarily neutral.

All potassium salts are negatively chemotactic.

Abstracts and Reprints.

A CASE OF URETHRAL MYIASIS.¹

By N. LEON.

In 1898 I had the chance to observe for the first time in Roumania cases of myiasis. These observations were published in the *Archives de Parasitologie*, and also another case in 1900. This time of the four larvæ abstracted from an abscess in the gum one transformed into a fly (*Sarcophaga wohlfahrti*). I communicated other cases in 1912, and again in 1913 a case of creeping disease to the *Centralblatt für Bakteriologie*.

In July, 1920, a student, M. N. T., 22 years old, came to me and related that before going to bed he had urinated eleven worms which he brought in alcohol. Some days before he had felt at intervals slight tickling sensations, accompanied by erections and sometimes by ejaculations. On examination of the specimens under the microscope we recognized normal larvæ of *Musca domestica*, about 6 mm. long.

Certain authors, among them Leuckart, have declared that it was impossible for insect larvæ to live in the urethra or bladder on account of lack of air. However, we believe with R. Cheval that they find in these organs the biological conditions indispensable to their existence and development; obscurity, humidity, heat, nourishment and oxygen. Nourishment is supplied principally by the mucopurulent secretion, or the albumoid filtrate which lines the walls of the bladder or the urethra. They obtain oxygen either from the outer air or from the gas which the bladder contains in a free state.

I did not think that this case could be a fake, for the young man was a very serious student, robust and in good health. I expressed doubt about the cleanliness of the vessel, but the student assured me that the urine was clear, and the smallest foreign body could be seen even at the bottom of the white vessel. I then examined the organ to see if by chance the flies might not have deposited eggs under the prepuce where the larvæ might have made their way into the urethra. The organ was in a state of perfect cleanliness, so I had to abandon this hypothesis.

I recalled the case of Edouard d'Haeneus (1898); a patient who had eliminated from the urethra larvæ of the domestic fly had the habit when bathing to inject water into the urethral canal. In this case he probably injected into the bladder with the water fly eggs, and these were later transformed into larvæ. The young man said that he had never injected water, that formerly when attacked by blennorrhagia he had made medicinal injections, but that after his cure (three months previously) he had made a single further injection. In order to be convinced that there was really no trace of dis-

charge, I told him to press the organ tightly at the base. As he did this he declared that all at once he felt a tickling sensation. The organ immediately became erect, while the patient showed pain and evacuated in my presence from the urethra with sperm eight fly larvæ, resembling in every respect those which he had brought the day before in alcohol. The occurrence leaves no room for doubt that this is an authentic case of myiasis of the urinary passage.

July, 1920, was very warm at Jassy. The young man told me he slept at night without pyjamas, covered only with a sheet, which he threw aside at times on account of the extreme heat. The slight discharge still present as the last trace of the blennorrhagia had been sufficient to attract the flies, which, as is known, have a very well developed sense of smell. They had deposited their eggs in the neighbourhood of the urinary meatus, and larvæ had penetrated into the urethra, and perhaps into the bladder.

The explanation which R. Cheval gives of the penetration of fly larvæ agrees fully with this case. The genitalia, imperfectly protected by clothing, are visited in the early morning by flies attracted by the warmth of the body; if at this time menstruation, recent emission, or discharge from the bladder or urethra has left in the neighbourhood of the urinary meatus any trace of organic matter the flies easily deposit their eggs there. The victims, deep in sleep, cannot protect themselves. Placed under the edge of the prepuce or in the folds of the vulva, the eggs so protected and maintained at a high temperature will hatch at the end of a few hours, and endowed with remarkable vigour and activity the fly larvæ incessantly creep about until they end by finding the urinary meatus. Thanks to their insignificant size, they circulate in the mucus without provoking sensible tickling sensations and pass easily into the urethra.

I hoped that the larvæ would be transformed into nymphs, but two days later all eight were dead. I saw the young man again a month later. He told me he had not felt a single one of the symptoms he had noted previously. Probably all the larvæ had been eliminated naturally.

AN EARLY PORTUGUESE CONTRIBUTION TO TROPICAL MEDICINE.¹

By CARLOS FRANCA, Collares, Portugal.

(Translation by Professor Clifford Dobell, F.R.S.)

It is impossible not to recognize the scientific character of the conquests and discoveries of the Portuguese in the fifteenth and sixteenth centuries. Nevertheless, in reading treatises on tropical medicines, we hardly ever meet with Portuguese names when the early history of the subject is under

¹ Abstracted from the *Journal of Parasitology*, vol. vii, No. 4, June, 1921.

¹ Abstracted from *Transactions of the Royal Society of Tropical Medicine*, vol. xv, Nos. 1 and 2, 1921.

discussion, though it would be surprising if the distinguished men among the Portuguese—who showed themselves, especially in Brazil, to be scientific colonists—had left no obvious traces of their activities upon tropical medicine.

Two of the historians of medicine, Maximiano Lemos and Ricardo Jorge, have noted that Portuguese physicians were the first to mention some of the tropical diseases. For instance, Garcia da Orta (1583) gave a very good account of cholera; Alexio d'Abreu (1623) described epidemic gangrenous rectitis (*mal do bicho*) and Ferreira da Rosa (1694) yellow fever. Even travellers who were not medical men gave remarkably accurate descriptions of certain diseases, and intuitively recognized the true nature of some of them. The chronicler, Joao de Barros (1552), noted the symptoms and ætiology of scurvy, from which the ship's company suffered on board the *Vasco da Gama*; and another chronicler, Gaspar Correia, described the cholera epidemic of 1543 with admirable precision; while the Jesuit, Gaspar Affonso (1596), gives one of the most complete accounts of *Dermatophilus penetrans*.

All these facts show that the Portuguese made contributions to our knowledge of the diseases of tropical countries; but not one of them appears to be as interesting as that which forms my justification for publishing the present note.

I have recently found, in a work of the sixteenth century, a very clear statement of the part played by insects in the transmission of *Frambæsia tropica*. In 1587 a Portuguese colonist, named Gabriel Soares de Souza, wrote a work containing a very interesting description of Brazil, and in it may be found most complete accounts of the history, geography and ethnography, and of the fauna and flora of our great American settlement. In this very remarkable work, which contains chapters surpassing those of Pisc and Maregaf, I have found a passage, the literal translation of which is as follows: "We must now refer to those mosquitoes which are called *nhitinga*, and which are very small and of the form of house flies; these do not bite, but are very troublesome, because they settle on the eyes and in the nostrils, and will not let one sleep by day in the open, unless there be a wind. They are very fond of sores, and suck the poison which is in them; and if they then go and settle upon any abrasion on a healthy person, they leave the poison in it, and hence many people are seen covered with *boubas*."

It should be noted that *boubas* is still at the present day a popular name for frambæsia in Brazil; whilst *buba* is the Paraguan designation for cutaneous leishmaniasis. In the Congo, frambæsia is known under the name of *boubas* in the Kishwahili language (van Nitsen), and at Zumbo (Mozambique) it is called by the same name (Capello and Ivens). It seems probable that the name *boubas*, and the disease to which it is applied, are both of African origin.

Although Wilson (1868) recorded that it was believed in the West Indies that frambæsia is carried by flies, it is only in recent times that the conditions necessary for its transmission have begun to be

understood. Hirsch (1898) gives a description of two cases in which the disease appeared to him to have been conveyed by flies. Both parents were living with children suffering from frambæsia, and both presented "raw surfaces which could be inoculated by the poison." Cadet (1897) considered that infection can only occur through pre-existent cutaneous lesions.

But it was not until 1907 that Castellani demonstrated experimentally that flies can transmit *Treponema pertenue*. He fed a certain number of flies (*Musca domestica* and allied species) on scrapings from the slightly ulcerated papules of patients suffering from frambæsia; and on examining twenty-five of these flies subsequently he found *T. pertenue* present in preparations made from four of them. He then placed flies, contaminated in a similar manner, on the deeply scarified eyebrows of twelve monkeys, and succeeded in thus infecting three of these animals.

It would thus appear that our Gabriel de Souza clearly understood the part played by non-biting diptera in the transmission of frambæsia, while he accurately defined the condition necessary for infection—the previous existence of an excoriation of the skin, upon which the flies deposit the virus. One would like to know to what little bloodsucking dipteran, of diurnal habits, the name *nhitinga* was applied; but I have not been able to elucidate this question.

It will be seen that Gabriel de Souza held views far in advance of his time. He might well have written, indeed, a recent chapter on the mechanism of infection, and even on the prophylaxis, of frambæsia, thus anticipating modern views by three centuries. His name is one, therefore, which should henceforth figure in the history of tropical medicine.

ADDENDUM.

Professor Clifford Dobell, F.R.S., to whom I wrote on discovering the passage cited above, has had the kindness to inform me that J. P. X. Sigaud, in his work "Du Climat et des Maladies du Brésil" (Paris, 1844), refers to a manuscript which is in the Royal Library at Rio de Janeiro, and which treats of frambæsia (yaws or pian), and is dated 1587. Professor Dobell was struck by the correspondence of the date and subject with those of De Souza's manuscript; and it is, indeed, a very curious coincidence that there should be in existence two such manuscripts dealing with frambæsia and both bearing the same date 1587). The manuscript of which Sigaud knew, however, does not mention contagion by diptera; but it is, nevertheless, interesting. It records how general the "mal de bobas" was among the Tupinambas, and notes the prevalence of the disease among children, and the native methods of treatment; and furthermore, it leads one to the conclusion that frambæsia was already distinguished from syphilis towards the middle of the sixteenth century. See "Descrição geographica da America portugueza, 1587." Chapter LXVI, p. 186.

A STUDY OF ACARICIDES.¹

By Professor HENRY.

FROM this study, which was purely experimental, it has been observed that the acaricidal power of any drug examined is dependent upon fairly numerous conditions, and may vary in considerable proportions under the influence of these. It is necessary to differentiate between *apparent* and *real acaricidal power*. Often the parasite touched is only in a state of apparent death, from which it emerges as soon as it believes itself out of danger. The chief results are the following:—

Sulphur and the majority of its compounds have only feeble acaricidal power, and some products have none at all. This does not apply to sulphurous anhydride and carbon sulphide, both of which are efficacious and rapid.

Arsenious acid, reputed to be an acaricide, used in a warm saturated solution, shows its action upon acari only after twelve hours of contact. The same can be said of sodium arseniate.

Mercurial ointment has no action even after eighteen hours.

Pure *petrol* will kill acari in about ninety minutes. When it is mixed with water, oil, or other vehicles, it loses that action entirely. For this reason sulphopetrolated ointment, and the mixture of equal parts of petrol, oil and benzine used by army veterinarians, show very little and sometimes no acaricidal power at all, even after forty-four hours' contact with the parasites.

Benzine acts more rapidly, usually in about fifteen minutes. But, from the practical point of view, this efficacy cannot be utilized on account of the rapid evaporation of the drug.

Nitro-benzine acts upon the acari in five minutes. Its use appears to be more practicable than that of benzine—it is less volatile and less irritant.

Nitro-benzinated oil acts in thirty minutes, and nitro-benzoated vapours in ten minutes.

Xylol appears to be very active, but one must fully guard against all possibilities before advocating its use in practice.

Turpentine kills acari in twenty-five minutes, but its irritant action often contra-indicates its use.

Creosote, pure, is very active in two minutes.

Creosotated oil (10 per cent.) acts in fifteen minutes.

True oil of castor acts in twenty-five minutes.

Balsam of Peru acts in twenty minutes.

Storax has no action.

Cresyl appears to be acaricide of choice. Employed pure, it kills acari in two minutes. In a 2½ per cent. solution (aqueous) it acts in ten minutes. A solution warmed to 27° C. kills in five minutes. A solution at 37° C. kills in one minute. A 3 per cent. solution at 37° C. is as active as the pure drug at 17° C. Even a 1 per cent. solution at 37° C. is very active.

Cresylated oil only kills acari in twenty-five minutes.

Oil of cevadilla kills acari only at the end of two or even three hours. Its acaricidal power falls when warmth is used in its preparation, and therefore it should be prepared in the cold.

These are the chief results of the author's studies. They contradict the results of practice, but they nevertheless furnish valuable lessons.

A COMPARATIVE STUDY OF SYPHILIS IN WHITES AND IN NEGROES.

By ERNEST L. ZIMMERMANN, M.D.

Baltimore.

VARIATIONS in the reaction of persons to syphilitic infection have caused much speculation. Fifty years ago Fournier emphasized the impossibility of predicting the course of a syphilitic infection. Even to-day we can offer a prognosis only on the basis of efficient treatment.

Quoting Krause, "two really fundamental factors can possibly have an influence on disease. These are inheritance, or the nature and activities of tissues as born into the world; and environment, which includes every mundane experience which, directly or indirectly, may have an effect on the constitution and function of tissues."

Inheritance probably explains in part certain differences in tissue reactions in syphilis, such as the early development of allergy in syphilis maligna, and the apparent absence of such a process in syphilis secundaria tarda. Inherited differences may have a determining influence on the localization of syphilitic lesions in various tissues or on the character which these processes assume.

Environment, employed in its broadest sense, embraces numerous considerations. It includes occupations, habits, associated disease and the effect of treatment. The latter is obviously of paramount importance in influencing the course of syphilis, when we consider the powerful antisymphilitic action of the drugs employed, with their varied chemical composition and their fundamental differences in mode of action on spirochetes and on syphilitic processes.

In syphilis there may be added as an additional influence on the course of the disease, variations in strains of *Spirochæta pallida*, a conception long suggested by clinical observation and apparently substantiated by recent animal experimentation. It is, however, hardly conceivable that strains infecting the negro differ from those harboured by whites, except in so far as racial antipathy and the legal restrictions placed on miscegenation prevent intimate personal contact between the races and pave the way for the evolution of strain variations. It should be stated that not all syphilologists accept the existence of strains of *S. pallida*, and more convincing proof must be adduced before the question can be definitely settled.

In this paper a comparative study of syphilis in whites and in negroes is undertaken for the purpose

¹ Abstracted from *La Semaine Vétérinaire*, 1921.

of emphasizing inherited racial differences in response to syphilitic infection. It is evident that inheritance and environment are closely interdependent. Environmental conditions may be immediately responsible for the bringing to light of inherited tendencies. There are, however, certain clinical characteristics of syphilis in the negro which can hardly be explained on grounds other than inherited biologic differences.

Racial differences in syphilis have been studied chiefly in the former German colonies, in the North African possessions of the French, and in the negro of the United States. Pertinent also are Neisser's experience among the Malays and Chinese of Java, von Düring's statistics from Asia Minor, and Lambkin's report to the British Government on Syphilis in Uganda.

Neisser states that racial differences are not improbable, and cites the results of Rotschuh in Central America, who found that syphilis assumed a milder form in the Indian population than in the white patients and negroes. Though Neisser's experience in Java gave him the impression that syphilis was most severe among white people and least severe among Malays, he found no clinical differences between the disease as it existed in Java and that observed in Germany. In his opinion the apparent severity does not depend on a special type of syphilis, but rather on the effects on the whites of climate, gastro-intestinal disease, malaria and alcoholism. Such an explanation seems reasonable for the supposedly severe course of syphilis acquired by whites in tropical climates.

That syphilis under certain conditions affecting a whole population may run an unusually violent course is shown in the case of endemic syphilis, especially as studied in Bosnia and Herzegovina. The following characteristics have been emphasized: frequency of extragenital infection acquired often during infancy and childhood, a tendency towards pustular, ulcerative, orbicular and follicular syphilis as secondary manifestations, the appearance of precocious tertiary lesions, a high incidence of ulcerative destructive tertiary lesions and the comparative infrequency of visceral syphilis, especially tabes and paresis.

Syphilis of the negro in Africa has been the subject of a few reports, all lacking in detailed clinical or statistical study. In a survey of syphilis in the German colonies, Heim finds no differences between syphilis in the negro and in white people. Primary and secondary manifestations are generally disregarded by the natives. From the "Medical Reports for German East Africa" Heim makes the following statements: The initial lesion among the natives is persistent, but rarely phagedenic. Secondary manifestations are often severe with a tendency towards frequent recurrence. Glandular enlargement is often so extreme as to recall trypanosomiasis. In reviewing these reports over a period of seven years, Heim found only seven cases of tabes and two cases of general paresis recorded. He mentions Schroedter's observations of syphilis

in German South-West Africa, and states that roseola occurs in blacks, appearing as an intensification of the normal colour of the skin. The dominating form of the secondary lesion in both male and female is the condyloma. Compared with syphilis in Germany, the course in the native is mild, even among tribes recently infected, no case of malignant syphilis, tabes or paresis being encountered.

Current Literature.

BULLETIN DE LA SOCIÉTÉ DE PATHOLOGIE EXOTIQUE.
No. 5, 1921.

On a Herpetomonas of the Dormouse (A. Laveran and C. Franchi).—Parasites resembling *Herpetomonas* were found in the blood of three dormice (one young and two adult) out of seven captured at Bologna during the summer of 1921. In stained smears from the blood, liver and spleen the dominating form consisted in small free elements, spherical or more often oval, measuring 1.8 microns in diameter, or 1.8 to 3.6 microns in length by 1.2 in width. The smaller of these elements showed a nucleus only, but the greater number were leishmaniform, with a nucleus and centrosome. Some of them, evidently in process of division, showed two nuclei and one elongated centrosome, or two centrosomes. Besides the small forms, the blood and liver smears contained elongated *Herpetomonas*-like elements, with a nucleus and centrosome, but no flagellum, measuring from 5 to 20 microns by 1.2, and also typical *Herpetomonas*, with bodies of from 12 to 20 microns in length by 1.2 microns broad, and flagella often longer than the body. Rounded, nucleated elements with thick walls no doubt represented encysted forms. The name of *Herpetomonas myoxi* is suggested for this parasite. Strangely enough, no fleas were found on the infected dormice, which were anæmic and showed swollen spleens.

Housing in Morocco (L. d'Anferville).—Immigration into the French Protectorate of Morocco is increasing to such an extent that the housing problem, particularly in the towns, has become acute. The native habitations are quite unsuitable for the accommodation of Europeans, and those which were erected in the early days of the Protectorate for the use of officials, &c., were designed for temporary use only, and are small and inconvenient. There is a great necessity for houses containing large, well-ventilated rooms and surrounded by gardens or open spaces, and it is suggested that the English methods of building, as seen in Morocco, might appropriately serve as examples for French architects.

A Case of Autochthonous Malaria due to Plasmodium Præcox (A. Lanzenberg).—Cases of autoch-

thonous malaria seen in France before the war were invariably caused by *Plasmodium vivax*, and a theory was held that the native anopheles did not serve for the development or transmission of the other hæmatozoa. In the present instance, however, a sergeant in the French Army, aged 41, was attacked by an obscure disease which, after having been diagnosed as anæmia of splenic origin, was finally shown, by the isolation of *P. præcox* schizonts from the blood, to be malaria. After a course of arsenic and quinine the patient was discharged from hospital as convalescent, his temperature having remained throughout the treatment in the neighbourhood of 37.6° C. Shortly afterwards he was seized by his first attack of fever and died three days later.

Autochthonous Malaria due to Plasmodium Præcox (G. Paiseau and Loubrieu).—The many reservoirs of malarial virus introduced into France by the war have not only occasioned a large number of *Plasmodium vivax* infections, as was easily to be foreseen, but have given rise to a few (but certain) cases of autochthonous infection due to *P. præcox*, which parasite had not before been seen in this country. Syphilis is apparently a predisposing factor in the ætiology of the disease as it occurs in France; 50 per cent. of the fifteen cases seen, and all those in which it assumed a severe form (including one fatal case), were in syphilitics of from eight to twenty-five years' standing. It would appear, therefore, that the influence which has for so long been attributed to such parasitic diseases as dysentery, in the causation of malaria in hot countries, should, in France, be looked for in syphilis. It would be logical to think that the abnormal conditions under which the transmission of *P. præcox* takes place in this climate would cause considerable modifications in the clinical characteristics, and especially in the gravity of autochthonous malignant tertian malaria, and all the more so as benign tertian malaria contracted under similar conditions is usually particularly benign. This is not the case, however, as all the essential features of the disease as seen in the tropics have been observed in the autochthonous form. Another question raised by these locally acquired infections is whether they follow the rule that *P. præcox* infections transform with time into *P. vivax* infections. In two of them an abnormal persistence of *P. præcox* in the blood seemed probable, while in six instances the parasite of malignant tertian malaria was seen between February and June, a period during which it is very rarely found in the blood of repatriated patients or those living in regions where tropical malaria is endemic.

The Treatment of Alopecia Areata of the Scalp and Considerations on its Ætiology (E. Pinoy).—In the absence of proof that alopecia areata of the scalp be of parasitic origin, the author has treated it as though due to some germ amenable to anti-septics, such as cade oil, formol, copper sulphate or

iodine, and has derived great success from the following:—

Copper sulphate	...	...	2.50 gm.
Water	q. s. to dissolve completely		
Lanoline	}	...	â 25 gm.
Vaseline			

This ointment is applied to the whole head (not only to the affected spots) every night, and is removed next morning with the following lotions:—

Eau de Cologne	...	...	300
Tincture of iodine	...	...	60 drops

The patches are then rubbed with a pad soaked with Fiovanti balsam. Under this treatment both primary and secondary patches cease to gain ground, and new hair frequently begins to appear in less than a month.

On the Rational Utilization of Convict Labour in Guiana (W. Dufourgère).—Examining the reasons for the meagre results derived from convict labour in the French penal settlement in Guiana, the author shows that not only are the measures taken to safeguard the health of the prisoners totally inadequate, but the latter are insufficiently fed and given no incentive to work. Of the two endemic diseases which account for most of the deaths and sickness, malaria and ankylostomiasis, much has been done to combat malaria, but the rules concerning the prophylactic administration of quinine are not sufficiently stringent; moreover, the infected are allowed to mingle with the healthy, the use of wire netting, suitably constructed habitations, &c., is not generalized, and the men have up to the present been allowed to go about barefoot. As regards ankylostomiasis, 75 per cent. of the convicts are infected, the prophylaxis which had been instituted before the war not having been maintained.

The author considers a better diet necessary to render the men capable of heavy work. He is also of the opinion that if it is undesirable to give rewards in money, incentive to effort might be provided in the form of extra rations and little luxuries.

Treatment of Intestinal or Vesical Bilharziosis by Intravenous Injections of Tartar Emetic (R. Baujean).—Wishing to test the efficacy of the tartar emetic treatment described by McDonagh and Christopherson, the author used this method exclusively while in charge of the Native Division of the Colonial Hospital at Dakar. A slight modification was instituted in the technique (consisting in the use of a rather more concentrated solution, which was not further diluted at the last moment), but the total quantity and doses of tartar emetic advised by Christopherson were adhered to. Six cases of vesical bilharziosis and twelve of intestinal bilharziosis were treated, and though in three of the latter the method had to be abandoned owing to intolerance or a very bad general condition, the results in the remaining fifteen were highly encouraging. Moreover, even when ordinary sym-

ptoms of intolerance appeared, it was found possible to interrupt the treatment, resume it after an interval, and effect a cure without exceeding the total quantity of tartar emetic specified. Sufficient time has in no instance elapsed to justify a statement that the cure is radical and final, but those cases which have been kept in view since treatment are favourable to such a hypothesis.

Blood Infections and Carriers of Parasites in the Blood (E. Escomel).—By using a process of erythrolysis, consisting in mixing freshly taken blood with a 1 per cent. solution of acetic acid in distilled water and then centrifuging immediately, the leucocytes, bacteria and protozoa contained in the sample may be very rapidly estimated. The method facilitates the diagnosis of blood infections and serves as a guide to prognosis, treatment and progress as well as to prophylaxis in certain cases. It enables affections due to the presence of parasites in the blood to be classified as *active* (when the germs are living on the blood itself), *indifferent* (when the parasites are infecting one or several organs of the body and are only occasionally present in the blood), and *latent* (when the germs seen are not producing any clinically morbid symptoms and their presence had previously been unsuspected). In the *active* cases the erythrolytic method enables a rapid calculation to be made of the number of parasites in the blood and compared with the leucocyte count; a chart showing the variations in the attack by the one and resistance by the other may then be drawn up. In the *indifferent* cases an explanation of otherwise obscure medical and surgical infections may be found. *Latent* parasites in the blood may, in view of the rapidity and simplicity of the method, be systematically sought for before all surgical operations, and adequate measures taken to prevent the establishment of post-operative infections.

Experiments in the Hereditary Transmission of Dourine (L. Nattan Larrier).—The virus used produced an infection in mice within twenty-four hours after inoculation into the peritoneum, and death on the fourth or fifth days; in rats the inoculation period was the same, but death occurred between the fifth and eighth days. The results of all the methods tried, both in rats and mice, showed that the infection never passed from the mother to the foetus, though the young of an infected mother were frequently stillborn. A further series of experiments undertaken to demonstrate whether, in rats and mice, the young of females infected with *Trypanosoma equiperdum* possessed any degree of immunity to the disease, showed that under no conditions did they acquire any power of resistance.

Mycetoma of the Foot (Madura Foot Type) due to Aleurisma Apiospermum (J. Montpellier and P. Gouillon).—The case is the fourth authentic instance of Madura foot in North Africa to be described, though the condition is probably not rare there. Its interest lies in the identification of the parasite, the extremely rare *Aleurisma apiospermum*.

mum. The grains measured from 0.1 mm. to 1 mm., and were yellowish white in colour; they were generally smooth and regular, but sometimes tomentous when an agglomeration of small grains occurred. They crushed easily under the finger. Neither potash in 40 per cent. solution, acetic acid, nor hydrochloric acid dissolved them, even when heated. When crushed they showed segmented mycelia, sometimes ribbon-like, sometimes moniliform, from 2 to 6 microns, generally without protoplasm, and ovoid spores of about 10 microns, also apparently empty. All the elements were Gram-negative and stained badly by the usual means. Cultures were easily obtainable in any kind of wet media from fresh grains; never from grains preserved for five or six hours. According to the recent classification of Professor Vuillemin of Nancy, following that of Link (Berlin, 1809), the spores should be placed in the category of the *Aleuria*, i.e., between the double-contoured, barely differentiated and very adherent Chlamydospores, and the thin-walled, much differentiated and easily detachable Conidia. The fungus is therefore an *Aleurisma apiospermum*, and not a *Monosporium apiospermum* as stated by Saccardo (1911), who classified it with the *Conidia*. The only other case of mycetoma due to this organism on record is that given by Radaeli in 1911.

Medical News.

Third International Congress of the History of Medicine.—An International Society of the History of Medicine has recently been formed with its headquarters at Paris. It consists of national sections, in each of which are a limited number of members. The General Secretary of the Society, Dr. Laignel-Lavastine, Paris, has asked for a list of members from this country to be sent to him. The Society will hold a congress every two years, the next congress being fixed for July, 1922, in London. The General Secretary in England, to whom letters may be sent, is Dr. J. D. Rolleston, 21, Alexandra Mansions, King's Road, London, S.W.3.

According to Dr. G. D. Whyte the study of the physiological processes of Chinese reveals interesting differences between them and Europeans. Using the standard methods of gastric analysis, one hour after the test breakfast, one finds in the Chinese that the hydrochloric acid, the total acidity and the motility are all diminished. On the other hand, the motility of the rest of the alimentary canal seems to be increased, for with many defaecation occurs twice daily, and save in sickness or starvation or amongst opium smokers, constipation is very rarely met with. In the urinary system, differences are also met with, the urine is usually more copious and always of lower specific gravity, while both the concentration and the total excretion of urea are much less than in "normal" Europeans.

Original Communications.

AN EXCEPTIONAL TROPICAL ULCERATION.

By RAYPH W. MENDENSON, M.D.

Principal Medical Officer of Health, Bangkok, Siam.

UNLESS specially interested the average physician in the tropics has a tendency to apply a blanket diagnosis to practically all ulcerations, and the term "Ulcus Tropicum" is used to cover a multitude of diagnostic sins. Fortunately most of the non-specific conditions do well under more or less casual treatment, but not infrequently such treatment fails to produce results. I have recently had occasion to treat three European patients for "leg ulcers" in which the exciting cause proved to be a monilia.

These three patients had all resided at the seashore for a short time in order to miss the hot season of the city and while there contracted in various ways small and insignificant abrasions which



after a short time developed into very small ulcers. From the history of a very closely observed case it would seem that the incubation period was about seven days and the ulcer developed as follows:—

Upon the site of the original abrasion, a mere scratch, there developed a small, hard and at first painless nodule. This in a few days broke down in the centre and becoming painful gradually increased in size until, as the illustration shows, an ulcerative condition resulted that was clinically unlike the usual non-specific ulcer seen in the tropics. In the first place it was constantly painful. It was punched out in appearance with marked rounded and elevated edges, the same being undermined and giving rise to very small daughter ulcers. The foot, unless elevated constantly, became swollen and the skin immediately surrounding the ulcer was inflamed and tender. At first the secretions were watery, but later on became purulent. A bacteriological examination failed to reveal any exciting organism, the purulent secretions consisting of white cells, as illustrated, with but an occasional coccus. Very carefully guarded cultures were

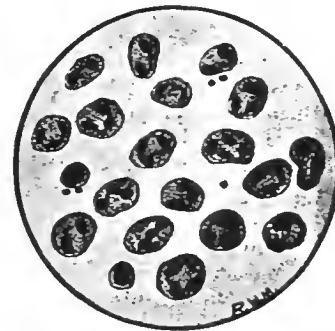
taken, the most absolute technique employed, and a rich monilia growth on glucose-agar obtained. Several cultures have failed to produce any other organism whatever, the ordinary cocci failing to grow in the presence of the monilia. This mould has been sub-cultured, but so far animal inoculation has been negative.

The three cases seen have been clinically the same. The cardinal symptoms being constant pain, which is unusual in an ulcer that reaches a chronic stage, and swelling of the part affected. The rounded, elevated edge and acutely inflamed surrounding tissue is quite in contrast to the usual ulcer seen. The same mould obtained in two cases and the absence of any other growth in all three cases is significant.

The treatment of these cases is not satisfactory. The application of ointments has a tendency to



Glucose-agar, five days.



Smear from ulcer showing many polymorphonuclears, two lymphocytes and five cocci.

break down the edges of the ulcer and allow it to spread. This has not been noticed in other ulcerations. The mildest ointment will do it. Alcohol, if it is to be of any use, must be constantly applied, and although the secretions are lessened and the base of the ulcer becomes healthy-looking, the granulations are hardened and do not grow, and as soon as the alcohol is stopped the secretions become profuse. Freezing with ethyl chloride has a marked, but temporary effect, especially as regards the pain.

The natural tendency is to complete cure in from two to three months with slight scar formation and pigmentation.

THE TREATMENT OF BLACKWATER FEVER.

By NATHANIEL CRICHLAW, Ch.B. (Glasgow).

Government Medical Officer, British Solomon Islands.

BLACKWATER fever is an acute specific fever characterized by great destruction of the red cells of the blood, intense jaundice and vomiting, and evidenced by the passage of reddish or very dark urine, which gives the disease its name.

There are four main theories of the essential ætiology of blackwater fever: (1) the malarial theory; (2) the quinine theory; (3) the combined malarial and quinine theory; (4) the specific theory.

Of these theories, the combined malarial and quinine theory seems to find the most supporters.

Workers in Macedonia and Africa support this theory. They found that previous to an attack of blackwater fever the patient generally or always suffered from malaria, and that the attack is generally brought on by taking quinine during one of those attacks of malarial fever.

The fact that malarial fever generally precedes an attack of blackwater fever is not a conclusive proof that it is the essential cause of the disease. There have been reported many cases of blackwater fever in which no preceding attack of malarial fever was experienced.

Then too, it is a known fact that in the tropics where malaria is prevalent, almost every disease is complicated with malarial fever. There is no doubt that quinine does cause hæmoglobinuria. Many regard it as the "last straw" in an attack of blackwater fever, but quinine should not be regarded as an essential cause of blackwater fever. It must be mentioned, however, that in blackwater urines there was found a new disintegration product of quinine provisionally called hæmoquinic acid, which showed hæmolytic properties.

The late Mr. Harold Row, as the result of his researches in the Malaria Laboratory of the 4th London General Hospital, suggested that the solution of the cause of blackwater fever must be sought in an abnormal condition of the red blood corpuscles, consisting of a reduced resistance to hæmolysis, produced by long-standing infection with *Plasmodium falciparum*, rather than as caused by the presence of any parasite, either of malaria or specific to blackwater, at the time of the actual attack.

From my experience in the British Solomon Islands, I have come to the conclusion that blackwater fever is due to a specific unknown parasite, and that malaria and quinine are only predisposing causes. Malaria is the most important of the predisposing causes, whereas too much stress must not be laid upon quinine as a factor.

The reasons for coming to this conclusion have already been stated by me in a previous paper.

In all my ten cases, which I have treated, I found no malarial parasites in the blood, but my examinations were made after the attack of blackwater fever had developed.

The presence of a large mononuclear leucocytosis

was constant, but this is not a proof of the disease being of a malarial nature, as a similar type of leucocytosis occurs in other forms of protozoal disease.

Whatever the cause of blackwater fever may be, the treatment is of the greatest importance.

TREATMENT.

The routine treatment of blackwater fever consists of the administration of fluids in the form of plain water, soda water, barley water, &c., by the mouth, and saline solution rectally, subcutaneously or intravenously as the occasion demands.

Rest in bed and careful nursing are of the utmost importance. Sternberg's mixture of bichloride of mercury and sodium bicarbonate is used extensively in some parts.

Calomel in large doses is a favourite remedy with some.

Cassia beareana is a favourite remedy with some and is regarded by them as a specific.

Cardiac tonics are important and should always be administered.

The administration of quinine during an attack is still a debatable point, but the general rule followed is that if the malarial parasites are found in the blood, quinine should be given, but if the parasites are absent, quinine should not be given. Some, who believe in the malarial cause of blackwater fever, assert that quinine should always be given and given early. They maintain that if quinine is administered early, the chances of recovery are greatly increased.

Many withhold quinine altogether during an attack.

Symptoms, such as vomiting, restlessness, sleeplessness and suppression of urine, are treated as they arise.

Among other drugs used in blackwater fever may be mentioned galy and allied preparations, colloidal arsenic and iron, acid sodium phosphate, methylene blue and cholesterin.

Until lately, the routine treatment adopted by me was as follows:—

- (1) Absolute rest in bed and good nursing.
- (2) On admission 3 gr. calomel given followed by a saline aperient.
- (3) Diet consisted of milk mixed with soda water or barley water.
- (4) Abundance of fluids given by the mouth, such as soda water, barley water, plain water, whey, lime juice and tea.
- (5) Rectal saline injections administered every four hours.
- (6) Sternberg's mixture every four hours.
- (7) Cardiac tonics.
- (8) Symptomatic treatment.
- (9) Quinine was withheld during the acute stage, but as soon as the urine clears up quinine bihydrochloride was administered, 10-15 gr. daily.
- (10) During convalescence, a tonic containing quinine, iron and arsenic given.

With regard to rectal saline injections, I note

that continuous rectal saline injections have been given in blackwater fever, but my experience of rectal saline injections is that if administered more frequently than every four hours, in a few days, the bowels become irritable and return the saline solution. Although I use Sternberg's mixture, I cannot speak of its effectiveness. Certainly it does not stop the vomiting, and whether it plays any part in clearing up the urine, I am unable to say. But in many cases, I found that they do just as well without Sternberg's mixture as with it.

The above lines of treatment were adopted by me in eight cases. In six cases the treatment was successful. In one case it was practically inert. In this case methylene blue was eventually tried and proved wonderfully effective in clearing up the urine and reducing the temperature. This drug has too drastic an effect upon the kidneys to be used as a routine in the treatment.

In the eighth case, although the case was brought under treatment at the beginning of the attack, the treatment was unsuccessful and the patient died within three days of the development of the attack. This case is interesting from the fact that there was very little vomiting, the patient was able to take plenty of fluids by the mouth, the rectal salines were retained, 80-90 oz. of urine were passed within twenty-four hours; yet nevertheless the patient had a second rigor attack on the third day; his temperature which had been dropping, rose; the patient became comatose and died. When the patient became comatose, two pints of saline solution were administered intravenously without any effect.

In the last two cases of blackwater fever that I have treated, more drastic treatment was tried and has proved successful. The routine treatment, as described above, was followed, but in addition, two pints of saline solution made with Burroughs, Wellcome and Co.'s saline compound tablets, with 2 c.c. of colloidal arsenic added, were administered intravenously on admission.

As I find that there is always a drop of blood-pressure immediately after an intravenous saline injection, during the injection the patient is packed with hot-water bottles, and immediately after the injection a hypodermic injection of strychnine 1/30 gr. and digitalin 1/50 gr. is given. Burroughs, Wellcome and Co.'s saline compound colloids contain per each solid the following drugs:—

Calcium chloride ...	...	...	10 gr.
Potassium chloride ...	...	...	10 "
Sodium chloride ...	...	...	31½ "
Sodium bicarbonate ...	...	...	10 "
Dextrose ...	...	...	3½ "

Two solids are dissolved in 16 fluid oz. of boiled or sterile water to form a saline solution for intravenous injection.

This injection is more efficacious than the ordinary saline solution in blackwater fever, and administered intravenously has the effect of clearing up the urine considerably and of shortening the acute stage of the disease.

What part the colloidal arsenic plays I am unable to state. F. Roux used the drug successfully in twenty-two cases. It would thus appear that this drug plays an important part in the cure of the disease. With regard to quinine, the rule I follow now is that if the patient had an attack of malarial fever previous to his attack of blackwater fever, and if he has been taking no quinine or only small doses, quinine is administered during the acute stage in small and cautious doses; but if the patient has been taking quinine previous to his attack, quinine is withheld until the urine becomes normal.

In one case I added 7½ gr. of quinine bihydrochloride to the intravenous saline solution. In the other case, before giving quinine, I gave calcium lactate—15 gr. daily—for three days. The calcium lactate was added to the rectal saline injections. The result obtained in these two cases by the administration of the intravenous injection as described above at the onset of the disease and at the beginning of the treatment, had decided me to adopt this treatment as a routine in the treatment of blackwater fever. No time should be wasted to see whether the attack will prove a mild and transient one or a severe one, but the injection should be given in all cases. If this treatment is adopted it may be the means of saving many lives.

Of course, this treatment has only been tried in two cases, but its effectiveness in these two severe cases speaks well for its success in the future. At any rate, it is the routine treatment I intend to adopt in all cases of blackwater fever in the future.

I herewith give particulars of the two cases in which this treatment was adopted:—

Case 1.—Male, 23 years old. Admitted at 7 p.m. on June 5, 1921. Patient admitted in an unconscious condition. History of present illness was that the day before he was apparently well and walking about. During that week he had an attack of malarial fever for which he took 10 gr. quinine bihydrochloride daily. On Sunday morning—the following morning—he began to vomit persistently and he was thought to have been poisoned. At midday he became unconscious. He was then seen by a qualified medical practitioner, who sent him into hospital with the diagnosis of cerebral hæmorrhage or sunstroke.

Patient was resident in the Solomon Islands for nine months only. He had malarial fever, but not often.

On making my examination, I made the tentative diagnosis of cerebral malaria or sunstroke. In order to enable me to form a correct diagnosis, I passed a catheter and withdrew 8 oz. of urine. The urine was dark-red in colour, of the consistency and colour of porter. I then knew the patient was suffering from blackwater fever. The urine boiled practically solid.

On admission, temperature 102° F., pulse 132, respirations 30. As drastic treatment seemed necessary in order to save the patient's life, I immediately gave the patient an intravenous injection of two pints of saline compound solution to

which 2 c.c. colloidal arsenic and 0.5 gm. quinine bihydrochloride were added. During the injections the patient was packed with hot-water bottles, and immediately after the injection a hypodermic injection of strychnine 1/30 gr. and digitalin 1/50 gr. was given. The patient was then given 3 gr. calomel.

The patient perspired profusely during the night. He passed during the night 6 oz. of urine of the same colour and consistency as the catheter specimen.

June 6.—Patient regained consciousness at 3 a.m. At 5 a.m. passed 6 oz. of urine. This urine was considerably clearer, dark-brown in colour and with a tinge of redness. Albumin less in quantity; temperature 99.2° F.; pulse 120; respiration 24. Patient extremely jaundiced. Mag. sulph. (½ oz.) given but vomited after its administration. Sternberg's mixture every four hours. Rectal saline injections every four hours. Quinine bihydrochloride 2 gr. t.i.d.

June 7.—Urine clearing up.

June 8.—Urine contains no blood and little albumin. Quinine bihydrochloride in addition to 2-gr. doses, 10 gr. given at night. As patient has been unable to sleep, 10 gr. ammon. brom. given at night. Patient slept well during the night.

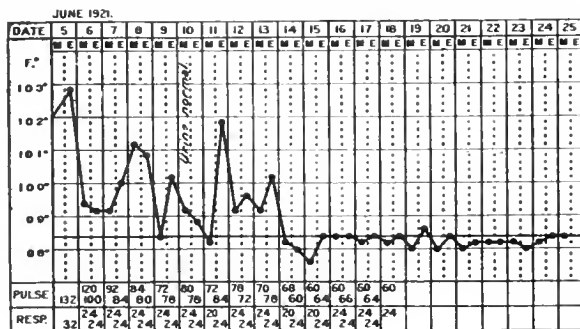


CHART 1.

June 9.—Sternberg's mixture suspended. Quinine bihydrochloride 10 gr. daily in 2-gr. doses. Calomel 3 gr. given in ½-gr. doses.

June 10.—Urine normal.

June 11.—Rectal saline injections stopped. Quinine 12 gr. daily.

June 14.—Temperature normal. Milk foods.

June 17.—5 gr. quinine bihydrochloride t.i.d.

June 19.—Full diet. Quinine, iron and arsenic tonic.

June 23.—Patient walking about.

June 25.—Patient discharged.

Case 2.—Male, 24 years old. Admitted at 4.30 p.m. on July 10.

Present history of illness.—Had rigor and vomiting at 4 p.m. Passed dark-coloured urine, the colour and consistency of porter, at 5 p.m.

Past history.—Resident in Solomon Islands for 2 years 11 months. Had malarial fever on and off. For the past three days previous to present illness

had malarial fever and had been taking 10 gr. quinine bihydrochloride daily. Day before attack, had severe attack of malaria and took 10 gr. quinine bihydrochloride. Felt better next morning and was walking about. At 11 a.m. took 10 gr. quinine bihydrochloride. Onset of present illness 4 p.m. On admission temperature 102° F., pulse 120, respiration 26. Urine very dark in colour, almost black, of the colour and consistency of porter. Much albumin present.

Examination of Blood.—No malarial parasites found. Mononuclear leucocytosis present.

Treatment.—Intravenous injection of B. W. and Co.'s saline compound solution (two pints) to which 2 c.c. colloidal arsenic and 0.25 gm. quinine bihydrochloride were added.

Hypodermic injection of strychnine 1/30 gr., digitalin 1/50 gr., calomel 3 gr.

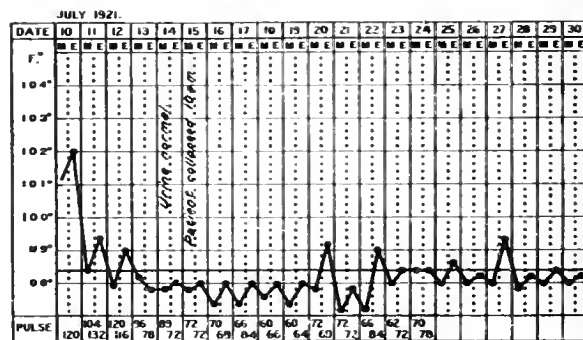


CHART 11.

Perspired profusely during the night. Patient very restless. From attack to 6 a.m. following day, passed 10 oz. urine. Vomited throughout the night. Very little sleep.

July 11.—½ oz. mag. sulph. given. Rectal saline injections every four hours. Sternberg's mixture given, but unable to retain it. Vomiting persistently. Tr. iodi, iced champagne, iced soda water and iced water tried for vomiting, but without any success. Patient only able to take pieces of ice. From 6 a.m. to 6 p.m. passed 6 oz. of urine, which was lighter in colour with heavy deposit and red shreds. Patient intensely jaundiced. Dozed at interval during the night. Vomited throughout the night. Perspiring profusely. Passed only 2 oz. urine during the night.

July 12.—Rectal saline injections every two hours. Calcium lactate per rectum 10 gr. t.i.d. Hypodermic injection of digitalin, 1/100 gr., every four hours. Sternberg's mixture stopped. Vomiting at intervals. Passed during the day only ½ oz. urine, dark brown in colour with heavy deposit. Vomited after iced lemonade and champagne given. Able to retain sips of iced soda-water and pieces of ice. Perspiring profusely. Slept at intervals. Calomel 3 gr. given at night in ½-gr. doses. Salines not retained during the night. Passed 4 oz. urine during the night.

July 13.—Calcium lactate continued. Rectal saline injections not retained well. Vomiting still.

Patient very weak. No urine passed during the day. Patient perspiring profusely. Slept at longer intervals during the night. Passed 10 oz. of urine during the night. Urine lighter in colour, albumin still present, no blood present in urine.

July 14.—Rectal salines every four hours. Calcium lactate continued. Patient taking barley water and ice readily. Still vomiting at intervals. Passed 6 oz. urine during the day. Slept better during the night. Passed 6 oz. urine during the night. Urine normal.

July 15.—At 10 a.m. patient collapsed, became very cyanotic, with no pulse at wrist. Recovered on hypodermic injection of strychnine 1/30 gr., and digitalin 1/50 gr. given and artificial respiration performed. Has desire to pass urine, but unable to. Passed catheter and withdrew 10 oz. of urine. No vomiting during the day. Quinine 5 gr. t.i.d. given in salines per rectum. Not retained. Passed catheter again at 6 p.m. Patient slept well at night and taking fluids freely. Passed urine, 10 oz., during night.

July 16.—No vomiting. Catheter passed and urine withdrawn. Quinine 5 gr. given morning and night, but vomited after taking it. Did not pass urine during the night. Slept well.

July 17.—Catheter passed and 18 oz. urine withdrawn. Quinine ethyl carbonate given—5 gr. t.i.d.

July 18.—Passed urine without any catheter being passed.

July 19.—Light diet given. Tonic containing quinine, iron and arsenic given.

August 1.—Patient walking about.

August 9.—Patient discharged.

It is interesting to note that the above case came from the same house from which the fatal case of blackwater fever came.

Three cases of blackwater fever have occurred in this same locality.

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TREATMENT OF TRYPANOSOMIASIS BY VARIOUS METHODS.

By Rev. CHARLES LEWIS TROUT, M.D.

YOUR recent articles concerning Dr. Marshall's treatment of trypanosomiasis have been intensely interesting to us. In 1914, while studying the treatment of *tabes dorsalis* by the Swift-Ellis auto-serum method with salvarsan, we were struck with the idea of using this technique in the treatment of sleeping sickness. Our first opportunity to carry out the idea came the first part of this year. Since last December we have been treating this disease at our Ara Mission near Lake Albert.

The cases we receive are always well advanced and show trypanosomes in spinal fluid. They are driven from their villages into the grass, and formerly the majority of these people were eaten by leopards. The majority of cases give a history of having been to the lakes to fish. The disease, as we find it here, is atypical and apparently progresses very rapidly. The blood, lymphatic glands and spinal fluid show trypanosomes, but we have never seen in these patients any oedema of the eyes nor large glandular swellings. The largest cervical glands detected to the present time have been about the size of common lima beans.

The first symptoms complained of are weakness, rheumatic pains in the joints, aggravated by walking, staggering, and finally short periods of unconsciousness. During this stage they fall when walking, and attract the attention of other natives to themselves, with the result that they are soon compelled to leave the village and live in the grass. After the staggering and falling symptoms they begin to sleep, and the disease progresses rapidly to death. They seldom live over four or five months from the onset of symptoms.

We have been experimenting along several lines in the treatment of these poor people, and will very briefly outline our work, with the hope that if others are working with similar treatments, or if these methods have been tried without successful results that the experiments may be reported. Until your articles were received we did not know others were using salvarsan by the Swift-Ellis technique. Here we have used salvarsan in this manner on just one patient; as the results were not as satisfactory as with the other preparations, we have used them instead. The patients have been placed in groups. Each patient's history has been obtained as far as possible with results of blood, lymph, and spinal fluid examination recorded.

Groups of from three to five patients in each group are being treated by the Swift-Ellis auto-serum technique with the following drugs: Galyl, iodine tincture (four to seven drops in distilled sterile water injected slowly, repeated twice before removing blood), urotropin (10 per cent. solution is used and injected twice before withdrawing blood), tartar emetic. As stated, our first case received salvarsan. The patient, male of about 30 years, was far advanced. There was apparently improvement, but patient died after a few weeks. Another case not so far along received kharsivan intramuscularly; six hours later the blood was taken from vein, it was placed in cold water stood overnight, and 10 c.c. of the serum was injected into the spinal fluid. This boy is still living. He has increased in weight and is able to do some work on the station. The galyl, urotropin and tartar emetic cases all have decidedly improved, especially tartar emetic and urotropin cases. We are not certain of the iodine group. These cases were nearer the death line than the others.

The modified technique is used with these drugs: Atoxyl, atoxyl and picric acid mixture and anti-

monium trioxide. This technique is used in two ways: first, the drug is given intramuscularly, six hours later blood is redrawn from a vein (we usually take about 20 c.c.). The blood in the sterile test-tube remains in cold water overnight. The following morning the serum is injected intrathecally. In the second subdivision of these groups the serum is obtained six hours after the intramuscular injection by raising a large blister with cantharides plaster. The skin is sterilized, and a sterile needle is passed into the blister, 10 c.c. of serum is withdrawn and immediately injected into the spinal fluid. We are also using this method following the intravenous injections as it simplifies the technique. The cases seemingly improve as much under this method as those receiving the regular Swift-Ellis technique. In this group the antimonium trioxide cases have shown best results.

We have a group of five advanced cases being treated with technique based on Duncan's auto-therapy method. 20 c.c. of the patient's blood (showing trypanosomes) is withdrawn in a sterile test-tube. This is placed some time later in a sterile mortar and triturated with ground glass very thoroughly for at least one half-hour (usually an hour if possible). While still triturating 200 c.c. of distilled water is gradually added. The solution is allowed to settle and is then passed through a Berkefeld filter (germ proof?). The filtrate is injected into the spinal fluid; usually about 100 c.c. under proper asepsis, &c. We are using this method very cautiously and are giving it to cases expected to die within a few weeks. But one injection has been attempted so far. We will try soon the effect of second injections intrathecally, and also subcutaneous injections. We have been afraid of anaphylaxis, but so far have had no bad results traceable to treatment. We are trying treatments with the spinal fluid prepared in similar manner and injected subcutaneously in increasing doses administered every three days.

We have tried treating some early cases with their own serum. These cases have received no drugs whatever. When they come to the mission and examination shows trypanosomes in the blood we apply a cantharides plaster, aseptically remove 10 c.c. of serum, and inject this into the spinal fluid. We have thought this simple treatment to be responsible for improvement, but these cases have been treated very recently, and consequently we do not know what it will do. We wish someone would try it out more extensively on early cases.

Naturally, in all these methods we observe strict asepsis, and in the serum methods we test out carefully the patient's sensitiveness to the serum preparation if we think it is necessary. We expect to try soon a serum filtrate obtained from several patients and attenuated. We have done some experiments with serum obtained in this manner, and think we have a method that eliminates to some extent the usual dangers of such treatment.

This is not meant for a complete report of our

work, as our patients have been under treatment too short a time to say definitely what the present results really are worth, but it may bring to light the report of more valuable treatment from other sources.

By the way, while in the northern part of the Congo we saw one case of leprosy. The Swift-Ellis technique after intravenous injection of chaulmoogra oil was the treatment. We lost track of this patient and do not know the results of treatment; perhaps someone else could try this method.

Has anyone tried the autoserum method of Swift and Ellis in the treatment of epidemic encephalitis? It might be used with uritone.

Thanking you for any suggestions you may be able to give us along the line of the treatments outlined.

A Note upon the Iodine-Phosphoric Acid Reaction in the Urine of Syphilis (R. A. Kilduffe, A.M., M.D., *Medical Record*, vol. x, No. 8, August, 1921).—Among the numerous "short cuts" proposed for the diagnosis of syphilis is a urine reaction originated by Gray. Two reagents are required: a 10 per cent. solution of phosphoric acid, and a solution of "re-sublimed iodine in chloroform or carbon tetrachloride."

In the series herewith reported the iodine was used as a saturated solution in chloroform because it was found that solutions of less concentration gave invariably "positive" results.

The urine, to be suitable for the test, must be fresh, with a specific gravity of less than 1.016 of acid reaction, and free from sugar; the recent ingestion of alcohol, or polyuria due to diuretics or the excessive ingestion of fluids all interfere with the test, so that the reaction is restricted to such cases as comply with the above restrictions.

The author comes to the conclusion that the reaction is unreliable and valueless as a means of diagnosis in syphilis.

Existence of Trypanosoma Dimorphon in Central Provinces of India (R. F. Stirling, *Veterinary Report*, January, 1921, vol. i, No. 4).—The author reports a case of *Trypanosoma congolense* infection occurring in India. Blood smears were examined from a bullock which died under conditions suggesting trypanosomiasis. Trypanosomes were discovered in large numbers, but they were totally unlike *T. evansi*, resembling more the organisms of the *dimorphon* (or *congolense-pecorum*) group, and a smear was sent to the Veterinary Research Laboratory of the Union of South Africa to obtain confirmation on this point. The Acting-Director reported that numerous trypanosomes were found belonging to the same group as *T. dimorphon*. The parasites measure from 11-18 microns in length, measurements which agree very closely with those attributed to *T. nanum*.

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THE JOURNAL OF Tropical Medicine and Hygiene

DECEMBER 15, 1921.

EARLY AND LATE MARRIAGES.

AT Lord Clifford's lecture on Friday, November 25, 1921, under the auspices of the Evolution Society, Sir James Cantlie, who occupied the chair, commented upon Lord Clifford's reference to the subject of eugenics. Sir James said, as chairman, he was compelled to refer to the subject of eugenics, but he hoped that this society would be content with mentioning the term merely and

not degenerate by going into the unsavoury subject which it opened the door to. There is a fashion to-day of discussing eugenics and sex problems under this and that Greek-derived heading, subjects based on matters which used to be left alone outside "polite" society and barred from our religious and secular schools.

The quasi-scientific manner in which so many societies take up the subject of eugenics has surrounded it with an atmosphere undesirable in itself and calculated to pollute the public mind.

Sex in all its phases—anatomically, physiologically, pathologically, economically, and racially—is at the present day flouted before young and old, at our drawing-room meetings, in our schools, in our halls and temples of quasi-religions, in the Press, and at times even in our churches under the cover of science. These discussions are accepted by many as *pure science*. Save the mark! More often than not it is *impure science* in all its surroundings and suggestions.

Children come to their mothers from school and ask questions which shock the parents to such a degree that many mothers have written to the school teacher and declared "that they do not wish their children taught about their 'insides' any more." The purity of the child is gone, and of such is not the Kingdom of Heaven.

Theoretically, there may be justification for this teaching; practically, it leads to pollution among children, the degree and amount of which must be passed over, for it is unprintable. The fact is that the talk of the pot-house has now become the talk of the nursery.

The subject of venereal disease is openly discussed nowadays. To instil into the minds of children how to prevent infection is supposed to be the duty of parents. What used to be ribald secrets pasted up only in obscure places are now made, as it were, copy-book headings for children to learn to write by, thus enforcing the legend that "evil communications corrupt good manners."

Human beings are, as regards the increase or decrease of population, being dealt with as the farmer deals with the breeding of cattle, horses, or pigs, and in such teaching the advanced followers of the Evil One revel.

The period of life in which disease is mostly contracted is in the pre-marriage days, and the longer that period extends the greater will be the number of people infected.

East and West deal with the question in different ways. In the West marriage is delayed until towards middle life; in the Orient early marriages are the rule. Among Asiatic people marriage is, perhaps, the most important social event of life. The parents regulate and arrange for the whole ceremony almost from the birth of their children to the actual marriage, and after. The intended husband and wife are chosen by the parents, their suitability, their health, their character are watched.

No man is allowed to marry a woman of the same name in China, thus avoiding the evils of consanguinity; hasty marriages are unknown, and

unsuitability, ending in separation, well-nigh unheard-of. Nor, after the marriage ceremony, are the young couple allowed to drift from the parent stock. As a rule, the bride's father's house is open to the pair, and there they remain under the watchful eye of the mother until, it may be, the first or second child is born, or, if the dwelling is a large one, they may remain all their married life under the parental roof.

A lesson to Christendom of the meaning of family life, and of the care taken for the continuance of the family in health and preservation from infection is to be found here.

In Europe, while the young oriental couple are being carefully guarded, the young man and woman are taught to put the thought of marriage away from them, and any talk of such a thing is discouraged. The parents do not arrange matters with neighbouring parents for the union of their children, no selection as to suitability, health, character, money affairs, &c., is ever dreamt of or studied.

So-called freedom, which the young demand, nowadays adds to immorality and the spread of disease; the Church has no longer pastors, but preachers, in its parishes; the parents' place towards their children is usurped by the school-master and the schoolmistress, acting for the State—a loveless machine.

How is the danger period of life to be met?

It is solved in the East by early marriages—anything between 14 and 18 for girls, and up to 20 or 22 for men. In Europe military conscription plays a wholesome part, and when it is applied universally to the youth of the nation it is a factor of primary hygienic importance.

Military conscription means muscular exercise, and by that means alone is introspection prevented and thoughts diverted from self. In Great Britain outdoor games take the place of conscription, and they have this advantage—that whereas military training lasts for but a year or two usually, cricket, football, tennis, rowing, and other sports are followed for from fifteen to thirty years of a man's life.

Boys at our public schools are more or less compelled to take part in games. By strenuous endeavour in various wholesome sports a spirit of emulation is created, whereby maintenance of interest is sustained and thought diverted from introspection and corrupt ways.

The surest measure of success of the three methods mentioned to preserve young men from misdemeanour is early marriage.

In the upper classes in Britain the pre-marriage period is so extended that the love of games, and sports, and gymnastic excellence wanes soon after 24, and a marriage does not, as a rule, take place until some years afterwards.

Restraint by marriage, early or late, is not improved by teaching the young about their "insides." It besmirches the child's mind, and the evil done to its soul is irrevocable. By "insides" is not, of course, meant digestion, circulation, and all that appertains to "first-aid" work.

It is when it is extended to the one subject that religion devotes 90 per cent. of its teaching to thwart, yet dare not speak of except in obscure language, such as "secret sins," &c., that the evil arises.

It is a difficult subject to teach without doing more harm than good.

The ruling passion of youth is easily excited, be the reference ever so reverently handled. After a lifetime of experience all old men will hesitate to state their conviction that so-called "eugenics" should be touched upon in other than very exceptional cases of youth.

The question of the effect of the matters discussed above on women is not mentioned, for the physiology of men and women is a thing apart.

Women are ruled by instinct, an unfailing mentor, a gift from God which modern teaching by women is doing its best to thwart, and the results so far have not been encouraging.

Sports for women are an unnecessary adjunct to their well-being, and may be harmful; time alone will show. That women can be taught men's games; that they can even excel is no proof that the sports are for the physical betterment of women.

This, however, is merely an academic discussion.

Modern circumstances of life would seem to annul the possibility of early marriage in this country. Still, the question is not so inapt as it might appear, for the bachelor of, say, 30, usually spends more money on his so-called pleasures than he would do were he married to a right-minded wife who had been chosen from a good home.

J. CANTLIE.

Medical News

Tropical Diseases Library.—Since the removal of the Tropical Diseases Bureau to the buildings occupied by the London School of Tropical Medicine the libraries of the two institutions have been united. The common library, which is known as the Tropical Diseases Library, is administered by a committee representing both institutions as well as the Seamen's Hospital Society, who are the trustees. The aim of the Tropical Diseases Library is to promote the study of tropical medicine and hygiene generally, and the library and reading room are open daily from 9 a.m. to 6.30 p.m. (except on Saturday, when they close at noon) to all members of the profession who are interested in those subjects.

Cinchona Cultivation in Burma.—The shortage in medical supplies experienced during the war has led the authorities to avail themselves of the resources of the Empire and to develop them as far as possible, with the result that the Government of India proposes to greatly extend the cultivation of cinchona. The areas at present cultivated are in the Nilgiri Hills, Coorg, the Malabar and the Darjeeling districts. It is now hoped to cultivate cinchona in Burma.

Annotations.

Investigations re the so-called "Match-Eczema" and its Causes (James Strandberg, *Acto Dermato-Venerologica*, vol. i, No. 1).—Many cases of "match-eczema" have been reported from Sweden, Denmark, and other countries using Swedish matches. Owing to the war the Swedish factories used sesquisulphide of phosphorus as a substitute for amorphous phosphorus in the composition applied to the striking surface of match-boxes, and it was this that apparently caused the match-eczema, as workmen handling sesquisulphide in the factories all developed skin-eruptions, while this did not occur when handling the mixed compound. No toxic results were obtained from introducing the composition *per os* into rabbits, and it is concluded that match-eczema is a toxicodermnia caused by sesquisulphide of phosphorus incorporated in the compound on the striking surface of match-boxes, and that bad glue is a contributing cause to this skin affection.

Notes on some Fungal Infections in West Africa (J. W. S. Macfie, *Annals of Tropical Medicine and Parasitology*, vol. xv, No. 3, September, 1921).—From the faeces of a European with dysenteric symptoms a fungus of the genus *Monilia* was isolated. This organism belongs to the *Tropicalis* group of Castellani, and appears to resemble most closely *M. tropicalis* (Castellani, 1909).

From the faeces of two Africans suffering from a peculiar form of diarrhoea two fungi of the genus *Monilia* were isolated, both of which appear to be hitherto undescribed species. The one belongs to the *Pseudolondinensis* Castellani group, the other to the *Krusei* group of Castellani and Chalmers. The names *Monilia africana* and *M. enterocola*, respectively, are proposed for these organisms.

Chemotherapeutic Studies with Ethylhydrocupreine Hydrochloride in Experimental Pneumococcus Pleuritis (J. A. Kolmer, M.D., and J. R. Sands, *Journal of Experimental Medicine*, vol. xxxiii, No. 6).—Solutions of ethylhydrocupreine (optochin) hydrochloride show a pronounced bactericidal activity for pneumococci in pleural pus. The highest tolerated dose of ethylhydrocupreine hydrochloride for guinea-pigs by intrapleural injection is about 0.02 to 0.3 c.c. of a 1:100 solution per 100 gm. of weight, corresponding to 2 to 3 c.c. of solution or 0.02 to 0.03 gm. of the drug per kilo of weight. The injection of 1 c.c. of a 1:500 solution of ethylhydrocupreine hydrochloride into each pleural cavity of a guinea-pig weighing from 350 to 500 gm. produces no evidences of toxicity or irritation of the pleura. The injection of 1 c.c. of a twenty-four-hour dextrose blood broth culture of virulent Type 1 pneumococci into the right pleural cavity of guinea-pigs produces acute suppurative pleuritis on both

sides associated with suppurative pericarditis, which generally terminates fatally within seventy-two hours with pneumococcus bacteraemia.

The injection of 1 c.c. of 1:500 solutions of ethylhydrocupreine hydrochloride into each pleural cavity of guinea-pigs at varying intervals up to twenty-four hours after pleural infection has usually shown a marked curative influence. Similar results were observed with dogs. The intrapleural injection of mixtures of ethylhydrocupreine sodium oleate, and boric acid (Lamar) has also shown a decided curative effect in acute suppurative pneumococcus pleuritis of guinea-pigs.

These and similar experiments on pneumococcus meningitis suggest that in chemotherapeutic investigations certain drugs may be injected into serous cavities in amounts exerting distinct bactericidal activity *in vivo* without producing local irritation or general toxic effects.

Top Minnows as Yellow Fever Eradicators (*Science*, Lancaster, Pa., May, 1921).—Top minnows were used with such success for the eradicating of malarial mosquitoes in various parts of the United States that the method has been adopted for the eradication of the yellow fever mosquito (*Stegomyia fasciata*) at Tampico, Mexico, in preference to oiling.

Tropical Inguinal Granuloma in Eastern United States (A. Randall, J. C. Small and W. P. Belk, *Journal of Urology*, Baltimore, June, 1921).—The authors believe that this disease has been present practically constantly in the General Hospital, Philadelphia, as long as the doctors and nurses can remember. Smears from the lesions, properly prepared and stained, form a reliable method of diagnosis. In four instances the granuloma organisms have been grown in cultures. All the cases with one exception occurred in negroes. The treatment found to have the best results was intravenous injections of antimony tartrate in doses of 0.4 to 0.1 gm.

A Case of Blackwater Fever occurring in Mesopotamia (Captain A. G. Harsant, *Journal of the Royal Army Medical Corps*, vol. xxxvii, No. 5, November, 1921).—The author describes a case of blackwater fever in which the patient had previously had sixteen attacks of malaria, with ague attacks every three to four weeks. In April, 1921, he was admitted to hospital apparently suffering from another malarial relapse. For two days he had intermittent temperature; his colour and general condition were good, his spleen was considerably enlarged below the costal margin and tender, and he vomited at intervals. A mixture of quinine 15 gr. was given three times a day. On the third day there was pain in the right side of the chest, but no abnormal signs could be detected. On the fourth day the patient collapsed, vomiting fre-

quently, skin slightly jaundiced, and urine almost black. An intramuscular injection of quinine bihydrochloride 15 gr. was given, and later the patient had a severe rigor, temperature 103° F. in axilla. Pulse 136, very weak. He was vomiting bilious fluid, and his jaundice was rapidly increasing. There was tenderness over the spleen and in the right hypochondrium, where the lower edge of the liver was just palpable. A further intramuscular injection was given. On the fifth day the patient was pallid and collapsed and was still vomiting. One pint of bicarbonate and saline and 10 gr. quinine bihydrochloride were given intravenously. The bicarbonate and saline injection was repeated on the seventh day, when the patient's condition was still critical.

Although malarial parasites could not be demonstrated in his blood, he was given an intramuscular injection of quinine on five successive days. This resulted in a steady fall of temperature, and an equally steady improvement in symptoms. He was evacuated to the base for transfer to England on the twenty-fourth day.

Alkali Tolerance in Pellagra (M. X. Sullivan, *Journal of the American Medical Association*, vol. lxxvi, No. 15, April, 1921).—The data on venous carbon dioxide tension and alkali tolerance of the pellagra patients at the Pellagra Hospital in 1920 support the findings obtained with more marked cases in 1918 and 1919 by the venous carbon dioxide tension method and by the carbon dioxide bound by the blood plasma, that, as a rule, the alkali curve in pellagra, though tending somewhat downwards, is within normal limits. Of fifteen patients tested, only four showed an increase in tolerance to sodium bicarbonate. Of these four patients, only two showed a marked tolerance, and these two patients had severe diarrhœa.

A Case of Pellagra in Edinburgh (E. J. Wood, *Edinburgh Medical Journal*, vol. xxv, No. 6, December, 1920).—The author describes the case of a woman, aged 52, who was suffering from pellagra. She had lived in Edinburgh for the last thirty years. Four months previous to admission to the Royal Infirmary, Edinburgh, the patient became conscious of weakness in the legs, erythema appeared on the neck, hands and forearms, followed by soreness of the mouth and slight salivation. No mental symptoms were present, all the deep reflexes were absent, the pupils were normal, the voice suggested the neuritis of diphtheria. Sensation was practically normal, though the muscles were tender on deep pressure. No diarrhœa occurred.

A Study of the Leucocyte Changes in Pellagra compared with those occurring in Beriberi (G. M. Findlay, *Journal of Pathology and Bacteriology*, vol. xxiii, No. 4, December, 1920).—In pellagra

there is a slight increase in the total, but a decrease in the percentage neutrophile count.

In beriberi there is a decrease in the total, but not in the percentage neutrophile count.

In pellagra there is an increase both in the total and percentage lymphocyte count.

In beriberi there is a decrease in the total, but not in the percentage lymphocyte count.

Severe Forms of Undulant Fever (H. Rozies, *Progrès Médical*, No. 52, December, 1920).—The author is of the opinion that undulant fever is far from being a benign fever. The mortality in the civil population affected is much higher than in the naval and military forces, which is very low (2 per cent.). The severe forms are divided into hyperpyrexial, ataxo-adyamic, hæmorrhagic and persistent (formes interminables). The morbidity is increased when associated with other diseases, such as malaria, typhoid and paratyphoid, and tubercle. The treatment consists of control of infection by colloidal therapy and vaccine therapy, maintenance of the general nutrition, and treatment of complications arising.

Examination of the Fibrinous Reticulum in Undulant Fever (A. Daumas, *Comptes Rend. de la Soc. Biol.*, vol. lxxxiv, No. 4, 1920).—The author brings forward the idea that the early appearance of an increase in fibrin threads in the blood of cases of undulant fever may be a diagnostic sign of differentiation between these cases and those of an enteric nature.

Value of Wright's Reaction (E. Pringault, *Comptes Rend. de la Soc. Biol.*, vol. lxxxiv, January, 1921).—In testing the sera of cases other than undulant fever with the strains of *Micrococcus melitensis*, following the technique recommended by Nicolle, the author came to the conclusion that the reaction was of value provided that a well attested culture was used; the emulsion was made from at least three strains of *M. melitensis*; the serum tested was heated to 56° C. for half an hour, and that a positive result should only be returned when agglutination took place in dilutions of 1-250 and over.

Cancer in the Tropics (C. D. de Langen, *Nederlandsch Tijdschrift v. Geneeskunde*, Amsterdam, July, 1921).—The author gives a description of the results obtained from studies taken of all cases of cancer occurring in Java hospitals during the ten years ending 1916. Primary malignant disease of the liver, cervix, penis and tongue were the commonest form of the complaint. At the central hospital there were forty-four cases of cancer, but none in the stomach; cancer of the mamma is also extremely rare, and involvement of the gall-bladder or bile ducts was absolutely unknown.

Abstracts and Reprints.

PRURITIS OF ANAPHYLACTIC ORIGIN.¹

By MILTON B. COHEN, M.D.

ONE of the most troublesome conditions of the skin that the physician has to treat is pruritis. The large number of remedial measures suggested for the relief of this symptom, which is usually associated with some chronic metabolic disturbance, demonstrates the frequent inadequacy of any, or all, of them.

Many investigators, among them Schloss, Strickler and Walker, have studied the relationship of protein sensitization to skin diseases, such as urticaria, angioneurotic edema and eczema. Recently Fox has reviewed the literature on this subject, and has reported the results of protein sensitization tests on sixty patients with eczema. His results and those quoted in the literature seem to indicate that these tests "will ultimately prove to be of therapeutic assistance in a small proportion of cases of eczema of adults."

The two cases reported herewith are of interest because of the lack of demonstrable cause except the food anaphylaxis, the inefficiency of local and general treatment, and the complete cure following the elimination of the offending foods from the diet. Walker's method was followed in making the skin tests, using commercial proteins.

CASE 1.

History.—C. E., farmer, white, aged 41, married, whose family and personal histories were of no importance, and who had never had asthma, nor was there any history of asthma in the family, on July 4, 1921, consulted me because of intense itching about the genitals and in the anal region, which had troubled him continuously since the preceding January. The itching was so intense that he found it necessary frequently to stop all work and to obtain momentary relief by scratching. He had tried various local and internal remedies without relief.

Physical Examination.—The head, thorax and abdomen were negative. The skin about the genital region was reddened, thickened and rough. There were no edema and eruption. The urine was negative for albumin and sugar.

Treatment and Result.—Since the usual methods of treatment gave only momentary relief, it was decided to discover and remove the ætiologic factor if possible.

Skin tests were made with the proteins of all the foods eaten during a period of one month. There was a + + reaction to pork, with doubtful reaction to potatoes and milk.

Pork was eliminated from the diet. In seven days the pruritis disappeared, and has not returned during the last six months.

CASE 2.

History.—H. B., farmer, white, aged 25, consulted me, October 5, 1920, complaining of intense itching over the entire body of five weeks' duration. He had consulted several physicians, who had prescribed the usual local and systemic remedies without result. The family and personal histories were negative for asthma and allied conditions.

Physical Examination.—This was negative except for a slight roughening of the skin and a few excoriations caused by scratching.

Treatment and Results.—Skin tests were made, using the proteins of buckwheat, milk, eggs, pork, coffee, corn, tomato and chicken. There was a + + reaction to potato and a + reaction to buckwheat. The elimination of potato and buckwheat from the diet for nine days gave complete relief for five days, when potatoes were again eaten. The itching recurred in two days. Potato was again eliminated from the diet, with complete relief. There has been no recurrence of the symptoms in three months.

SCHISTOSOMIASIS IN THE YANGTSE VALLEY.¹

By Surgeon-Commander A. A. SANDERS, O.B.E., M.B., R.N.,
AND

Surgeon Lt.-Commander J. L. PRISTON, M.B., M.R.C.P., R.N.

MANY of H.M. ships have occasion to go up the Yangtse, and the officers and ratings are liable to be exposed to infection there; the writers, therefore, thought that it would be of interest to other medical officers to read a description of these cases, which might assist any who are not familiar with the disease in making a diagnosis. The literature to which we had access did not give a clear impression of early stages of the disease, and for the most part it deals with well-marked cases of old standing and heavy infection. It is therefore proposed to describe cases which appeared in H.M.S. *Hawkins*, together with a case of the disease contracted in 1913 at Hankow, and afterwards to give a short systematic account of the disease compiled from a consideration of these cases and from recent literature.

REMARKS ON SCHISTOSOMIASIS CAUSED BY S. JAPONICUM.

Geographical Distribution.—This disease has been described in Katayama, Bingo and Central Japan; in natives of Hunan and Fukien; near Kashing, Suehow, Kiukiang and Hankow; in the Philippines and in South Africa; it appears to be frequent on the Yangtse from Hankow to the sea. It is said to be very common in Korea.

Pathology.—The disease is caused by a trematode somewhat similar to *S. hæmatobium*. The adult is about 1 cm. long, and is found chiefly in the

¹ Abstracted from the *Journal of the American Medical Association*, vol. lxxvi, No. 6, 1921.

¹ Abstracted from *Journal of the Royal Naval Medical Service*, vol. vii, No. 3, July, 1921.

smaller mesenteric vessels. The ova may be extruded by the female into the perivascular lymph spaces, whence they may find their way into the lumen of the intestine, or may be carried via the mesenteric glands and thoracic duct to the great veins and heart, and so on to the lungs, brain, and all parts of the body. On the other hand, it is possible that a proportion of the ova may be carried by the blood-stream direct from the mesenteric vessels to the liver via the portal vein. The ova are found mostly in the mucosa and submucosa of the large intestine, especially in the appendix and rectum, in the mesenteric glands, and in the liver; they act as emboli, causing a round-celled infiltration, and ultimately fibrosis, &c. They interfere with the function of the organ in which they are; hence enteritis, cirrhosis of the liver with ascites, symptoms resembling appendicitis, general fibrosis of the lungs, sclerosis or softening of the brain, meningitis, &c. The bladder is not affected as it is in bilharzia disease.

The ova leave the host in the faeces, or in some cases in the sputum, and if they gain access to fresh water, hatch out as free swimming miracidia; these seek out a species of mollusc or water snail, in which they continue their life-history. *Katayama nosophora* is the intermediate host in Japan, but Atkinson believes the host on the Yangtse to be a species of *Limnaeus*. Water snails are so common in the snipe marshes at Tatung, Wuhu and Nanking, that they get into the gaiters and the boots of persons shooting. From the snail the parasite emerges as a cercaria, which may penetrate the skin of the vertebrate host (man, dogs, cats, &c.) or may be taken in by drinking the water. The exact route by which the embryo gets from the point of entry to the mesenteric vessels and the stages of development through which it passes are unknown. In two cases recorded there was, somewhere between fifteen and thirty-five days after the date of infection, a small patch of inflammation on one shin with a track of lymphangitis up to the femoral glands. In each case there had been an old lesion on the spot, and in each case the condition cleared up without suppuration in four days. It is suggested that the embryos may have developed locally into adults, and that when they began to lay eggs the inflammation and lymphangitis resulted. Finally, it is suggested that the conditions were unfavourable to the adults in this position, causing them either to depart elsewhere, or to die, so that the inflammation cleared up.

In bilharzia disease there is reason to believe that the embryos normally develop in the liver or spleen.

The initial attack of fever, urticaria, &c., is probably synchronous with the maturity of the parasites and the commencement of egg laying; the eosinophilia may be regarded as a protective mechanism of the host, and the later lesions, such as cirrhosis of the liver, brain lesions, appendicitis, &c., are the result of the accumulation of ova and the fibrosis they produce.

Incubation Period.—This is presumably the time taken by the embryos to mature.

In the cases recorded the incubation period was apparently as follows:—

Case 1.	Between 8 and 25 days.
2.	13 " 30 "
3.	14 " 31 "
4.	14 " 31 "
5.	25 " 42 "
6.	25 " 42 "
7.	25 " 42 "

The incubation period of Case 8 was presumably about one month.

It may be said with certainty that in none of the first seven cases was the incubation period more than forty-two days, and in none was it less than eight days. Supposing the period to have been approximately the same in each case it would necessarily have been about twenty-five days, and this entails the assumption that the first four cases were infected at Tatung and the last three at Nanking.

Case 6 was a mild case, and he only waded once for a short time at Nanking. Supposing him to have been infected at Nanking, this would account for his presumably light infection.

Symptoms and Signs.—The disease begins with an attack of fever with temperature between 100° and 103° F., the face is flushed, and there may be conjunctivitis of the fauces. The onset is usually gradual, and as the disease develops there is a little dry cough and usually some abdominal discomfort with distension, flatulence and furred tongue.

In one case recorded the onset was acute with diarrhoea and vomiting. After a few days in bed the patient feels better and the temperature falls, but he is then much troubled with general urticaria, which comes and goes. This urticaria may come on at the beginning or may be delayed; it is especially marked when the patient gets up, or after a hot bath. The eyelids, lips, fingers, and even palms of the hands may be affected, and it may come on at intervals up to two months after the onset.

Some cases complain of distressing lumbar pain, others have an irritating cough. In one case troubled with cough, an undoubted ovum was found in the sputum, and this may be the cause of the cough. In another case there was slight congestion at one base, and in another marked bronchitis.

When the temperature has fallen the patient gets up and about, but still feels far from well; the lassitude which troubles him is out of all proportion to the febrile attack, and he may have some diarrhoea. If he has been allowed up too early he probably has a relapse within a fortnight, when all the original symptoms recur, and now the liver and spleen may be found to be slightly enlarged, and there may be pea-soup stools and signs of enteritis. The temperature in this relapse is long continued and may be high, resembling that of enteric fever.

If the blood is examined now, a high degree of eosinophilia is found; in one case of our series 65 per cent. of eosinophilia were present, with only 13 per cent. of polymorphs. This eosinophilia decreases as the patient improves, in one case falling to 4 per cent. within a little more than two months, but it

may come down to about 25 per cent., and then persist for many years.

The ova of the parasite may now be found in the faeces or possibly in the sputum. In spite of repeated examinations of centrifugalized urine, ova have not as yet been found in the urine of these cases. The ova may be pale, translucent and presumably alive, or brownish and more or less disintegrated; they are oval, as a rule, about 7 microns in length, and do not show any terminal or lateral spine, but may have a small knob on one side which looks like a fold in the capsule. Under favourable circumstances, if the ova be examined in water, the miracidium may be observed to emerge and swim about.

In this series no blood has been detected in faeces, urine or sputum; this may be due to the fact that the ova have no spines. Melana, however, occurs in advanced cases with heavy infection.

A certain proportion of lightly infected cases appear to recover after this initial attack without any special treatment. Thus three of the eight cases recorded above were apparently perfectly well about two months after the onset.

Three more were apparently getting better when they were sent to hospital for treatment. It is, however, too early to be sure that these cases have actually recovered, for Case 8 appeared to recover completely, but after a period of strain eighteen months later he developed what seems to have been a slight cerebral lesion.

Natives of infected districts who are presumably heavily infected ultimately develop the symptoms and signs described in the text-books, such as ascites, cirrhosis of the liver, fibrosis of the lungs with a condition resembling pulmonary tuberculosis, chronic enteritis with passage of blood and mucus, hemiplegia, attacks of aphasia, and a variety of cerebral lesions, appendicitis, &c.

Skin irritation at the time of infection has been described in bilharzia disease and ankylostomiasis, but it was not observed in any of our cases. A remarkable condition of the skin of the leg was, however, an early sign in the onset of Cases 1 and 2.

Diagnosis.—A febrile attack accompanied or followed by marked persistent general urticaria in a person possibly exposed to infection should arouse suspicion; this may be confirmed by diarrhoea, cough, lumbar pain, and by the persistence of undue lassitude and malaise in convalescence.

Considerable eosinophilia (from 20 to 60 per cent. or more) is characteristic, and the discovery of the ova in the stools clinches the diagnosis. The ova may, as a rule, be found easily by examining one or two loopfuls of liquid faeces with four or five times the quantity of fresh water between two thin slides. They can easily be found with a two-thirds objective and further examined with a one-sixth. If the patient has diarrhoea a loose motion is the best, otherwise the search is facilitated by administering a purgative.

The ova are said to hatch out in the intestine if retained there by constipation; they also appear to degenerate rapidly, and for this reason a specimen

should be secured which has been passed rapidly through the large intestine.

An antigen test for the presence of *bilharzia* has been favourably reported on by Cawston, and might possibly be adapted to this other form of schistosomiasis in the later stages.

Prognosis.—The text-books, describing cases in the later stages, state that the disease is ultimately fatal, usually after many years.

It is, as yet, too early to draw definite conclusions from our series of cases, but Case 8 is in very good health seven and a half years after his attack, and there seems to be reason to hope that Cases 3, 6 and 7 will not be troubled any further. It must, however, be admitted that Case 8 had a cerebral attack after more than a year of apparently good health, and still has 25 per cent. eosinophilia in his blood.

Prophylaxis.—Bathing in any district possibly infected should be avoided; of course, raw water or salads and uncooked fruit and vegetable should not be eaten; these precautions are equally necessary to avoid dysentery. Persons going shooting in possibly infected areas should wear good waders free from holes, and must avoid putting their hands when wet to their mouths or recently shaven faces.

Atkinson suggests a device on the paddy fields water wheels to collect the water snails and prevent their access to the paddy fields, so robbing the miracidia of their immediate hosts. In the present state of China, however, it appears unlikely that the peasantry could be persuaded to use this effectively. The same objection applies to any plan for preventing the access of faeces to collections of water, or for catching and curing or isolating all known carriers, or to plans of destroying the water snail.

Treatment.—Treatment must necessarily be partly symptomatic, but it would seem that the only feasible method of eradicating the disease must be the introduction of some specific drug into the circulation direct.

The 1919 edition of Manson states that no specific remedy is known for this disease, but from a consideration of recent articles by Christopherson, Cawston, Low and Newham reporting favourably upon the exhibition of antimony tartrate intravenously in cases of bilharzia disease, it was thought that this drug certainly merited a trial in a condition obviously so closely allied.

Three cases were, however, first tried with a course of intravenous N.A.B., in order to observe the results with the intention of proceeding to a subsequent course of antimony if this proved unsuccessful. In each of these three cases four injections of 0.6 gr. were given. Considerable general improvement followed in Cases 1 and 4, but these patients were improving before they began their courses of injections, and in one of them (No. 4) a live ovum was found twelve days after the last injection. The third case (No. 5) does not appear to have benefited appreciably. The most serious case of the series (No. 2) is being treated with antimony according to Christopherson's suggestions, and although he

has received so far only 7 gr., he has improved remarkably both in general and with regard to his eosinophilia.

BRONCHIAL SPIROCHÆTOSIS.¹

By W. A. BLOEDORN, A.M., M.D., and J. E. HOUGHTON, M.D.

THE presence of bronchial spirochætes in the United States has been reported in only a few instances. It is our belief that the disease is more common and more widespread in this country than is generally recognized, and that if the nature of the infection and the possibility of encountering it were kept more constantly in mind, it would be more frequently observed.

Since 1906, when Castellani first described it, the disease has been regarded as a disease of tropical countries; not until comparatively recently was its presence in the temperate zones recognized and reported.

The importance of recognizing the fact that bronchial spirochætosis exists in this country cannot be overlooked. Its marked resemblance in many cases to pulmonary tuberculosis, its mild course as compared to that disease, the ease with which it can usually be recognized, and its rapid response to proper treatment, make it necessary that we should be on the alert to detect it. The routine examination of sputum should include a search for spirochætes. Failing to find other possible factors, such as tubercle bacilli, ova or fungi, the spirochæte should not be passed lightly over and regarded as a bucca, or pharyngeal contamination, unless such sources can be definitely demonstrated.

The history of bronchial spirochætosis is worth a brief review. In 1906 Castellani reported the occurrence, in the island of Ceylon, of a form of bronchial infection caused by spirochætes. He examined two natives who had had recurring hæmoptysis for some months, and in whom the physical signs did not suggest pulmonary tuberculosis. The sputum was negative for tubercle bacilli, but contained large numbers of actively motile spirochætes. He termed the organism found in these patients *Spiroschaudinnia bronchialis*, and described it as an organism with marked polymorphism, varying in length from 5 to 25 microns, and in breadth from 0.2 to 0.3 micron. As a rule, the ends are acuminate. Its movements are active, but cease shortly after leaving the body, and, according to Fantham, are succeeded by a granular stage from which new spirochætes are believed to be formed, and by means of which the infection is spread.

Branch, in 1906, confirmed Castellani's findings in the West Indies, and shortly afterwards Waters reported several cases from India. Jackson, in 1908, reported the disease in the Philippines, and in 1909 Phalen and Kilbourne also reported a case in the Philippine Islands, when in 1911 Chamberlain reported two further cases.

In 1910, Rothwell described four cases in the United States of what he termed bronchial Vincent's angina, in which spirochætes were associated with fusiform bacilli in the sputum.

The disease has been reported in various parts of Africa by Chalmers and O'Farrell, Taylor, Harper and others. Fantham, in 1915, published a very complete work on *Spirochaeta bronchialis*. Lurie, in 1915, reported a case of this disease in Serbia. Thompson, in 1918, described several cases of pulmonary spirochætosis among patients who had been invalidated from Salonica on account of chronic malaria. In 1915, Galli-Valerio observed several cases of the disease in Switzerland. It appears that very little attention was paid in Europe to the disease until it was found in France in 1916 by Violle, who observed many cases of the disease at Toulon among native troops coming from the East, as well as among the European forces who had never been to the colonies. He states that the patients were usually sent to the hospital with a diagnosis of tuberculosis or suspected tuberculosis.

Chalmers and O'Farrell have succeeded in reproducing the disease in a monkey by intratracheal injection. In 1919, Farah described the disease in Egypt occurring among the natives as well as among the foreigners in Alexandria. Nolf, in 1920, reported eleven cases of spirilla broncho-pneumonia in Belgium. Lewis, in 1920, reported a case of broncho-spirochætosis in a marine on duty in Cuba, who gave a history of hæmoptysis about a year previously, at which time he was on duty in the United States. Mason, in 1920, reported the case of a boy, aged 16, who had been in America since 8 years of age, and who developed a pleural effusion which showed many actively motile spirochætes. Trocello, in 1920, reported a case in Italy in which a patient gave a history of hæmoptysis at long intervals for many years, and which had been diagnosed as pulmonary tuberculosis. Levy, in 1921, reported two cases of broncho-pulmonary spirochætosis in Texas. One of these patients had had hæmoptysis at intervals for fourteen years. The second patient had symptoms of only a few days' standing.

Castellani distinguished three types of the disease, the acute type, the subacute type, and the chronic type. In the acute type the patient develops fever rarely exceeding 103, and coughs a great deal; the expectoration is usually scanty, and may contain traces of blood. In most cases the general condition of the patient is not much affected.

In the subacute type the attack may last from two to several weeks, with slight fever. The cough is frequent, and there may be expectoration of pink jelly-like mucus or true hæmoptysis. The physical signs in the chest may be negative or indicate only a simple bronchitis. Occasionally there may be patches of slight dulness and evidence of consolidation. There may be a slight degree of anæmia, but the white and differential counts are usually normal.

In the chronic type, which may follow an acute or subacute attack or several such attacks, the patient has a chronic cough and expectoration

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which may contain blood. Frequently there is no fever, or there may be irregular temperature. The physical examination usually shows only a few moist râles. Occasionally there may be signs of consolidation. The course of the disease may be prolonged with periods of improvement, and even apparent cure.

Pneumonia may be a complication, as well as tuberculosis and broncho-mycosis.

According to Castellani, a diagnosis of bronchial spirochætosis is based on the microscopic examination of the expectoration collected after cleansing the mouth and throat. Sputum may be examined fresh, or may be stained by the Fontana method or the various Romanowsky methylene-azure blue stains.

During the last year we have had three cases of bronchial spirochætosis and a fourth case in which the patient harboured the spirochætes, which were found following the course of a lobar pneumonia caused by the pneumococcus, and which persisted after recovery from the pneumonia. All of these patients were born in the United States, and while some of them had been outside the continental limits, it is safe to assume that their infection was contracted in this country.

REPORT OF CASE.

History.—A white man, aged 18, unmarried, complained of headache, pains in the back and shoulders, weakness, cough and expectoration of blood-streaked muco-purulent sputum. The family history was negative. The patient had had measles and whooping-cough in childhood; pleurisy in 1914, of two weeks' duration, with good recovery, and mumps in 1918 with good recovery. The patient was a native of Illinois, and had never been outside the United States, except into Canada. For three days prior to admission to the hospital the patient had been having headaches, muscular pains, poor appetite, slight cough and expectoration of blood-streaked sputum, which increased in amount as the disease progressed. There was no nausea or vomiting, and there were no symptoms referable to the abdomen; there was slight sore throat, and the patient had a feeling of general malaise and weakness.

Physical Examination.—On admission to the hospital the temperature was 103, pulse 96, and respirations 20. The patient was fairly well nourished and muscular. The skin and the mucous membranes were somewhat pale; there were no petechiæ. The lymphatic glands were not enlarged, and the spleen was not palpable. The abdomen was soft, and there were no tender areas or tumours. The liver extended one finger breadth below the costal margin. The pupils were equal and reacted to light and accommodation; the tongue was slightly coated. The tonsils were not hypertrophied, and there was slight congestion of the posterior pharynx and pillars, but no exudate and no evidence of membrane or ulcer. The teeth were in good condition; the heart was negative. Examination of the lungs dis-

closed only a few scattered râles at both bases; there was no impairment of resonance. The bones and the extremities were negative; the reflexes, both superficial and deep, were normal. The eye-grounds were negative.

Laboratory Data.—A Röntgenogram of the chest revealed a slight thickening of the bronchial tree on each side, the plate being otherwise negative. The sputum was negative for tubercle bacilli after repeated examinations during the course of the disease; throat cultures were negative for Klebs-Loeffler bacilli; blood smears were negative for malarial parasites, and blood cultures during the entire course of the disease were negative. The Nogouchi reaction was negative. The stools were normal and negative for ova or parasites, and cultures were negative for typhoid and paratyphoid bacilli. Blood examination revealed a white count which varied from 5,000 to 8,000 during the course of the disease, with a slight relative increase in the lymphocytic cells. The red cells, hæmoglobin and colour index were normal.

Clinical Course.—The patient continued to have fever with the temperature varying from 100 to 102 in the morning and from 103 to 104.8 in the evening. Profuse night sweats occurred with great regularity, and the patient during the first three weeks of his illness lost 20 lb. There was a slight cough and free expectoration of a thin, muco-purulent, blood-streaked sputum. The prostration during the course of the disease was not marked, and the patient stated that he felt fairly well, but weak. The case resembles so strongly in its clinical course a pulmonary tuberculosis that every effort was made to confirm such a diagnosis. The laboratory findings, Röntgen-ray findings and physical examination, however, failed to demonstrate the existence of such an affection. During the course of the repeated sputum examinations it was noticed that while the sputum was negative for tubercle bacilli, there were constantly present a large number of spirochætes. The presence of these organisms was at first not regarded as significant, and it was only after repeated attempts to establish a definite diagnosis in this case that their presence was regarded seriously. Their constant presence in the sputum after the teeth had been cleansed and the throat cleared with a mild antiseptic gargle, together with the absence of a lesion of the tonsils or pharynx which might account for their presence, appeared significant, and strongly suggested the diagnosis of bronchial spirochætosis. It was decided to try the effect of an arsenical spirochæticide, and on the twentieth day 0.6 gm. of neoarsphenamin was given intravenously, and on the twenty-first and twenty-second days the temperature again rose to 101 in the evening. On the twenty-fourth day, 0.5 gm. of neoarsphenamin was given intravenously, following which injections of 0.9 gm. of neoarsphenamin were given at intervals of one week, although the patient had shown no rise of temperature in the meantime, and was improving steadily. Following the injections of neoarsphenamin the improvement in the patient was striking.

The prompt termination of the fever, the rapid decrease in the number of spirochaetes and their ultimate complete disappearance from the sputum, the prompt termination of the cough, and the disappearance of the blood from the expectoration, which itself became almost negligible in quantity, leave little room for doubt regarding the efficacy of these injections. Two months following the onset of the disease the patient had regained his loss of 20 lb., had been up and about for several weeks, and was able to resume his original duties. Before discharge from the hospital he was given an injection of 10 mg. of tuberculin, following which he showed no reaction.

COMMENT

The organisms of spirochaetal nature encountered in the sputum of our patients more closely resembled *Spirochaeta* than *Treponema* in that they were more refractive, more active in movement, and tended to change shape in motion. In stained preparations a delicate, thread-like spiral organism was noted, measuring from 6 to 28 microns in length and 0.3 micron in breadth. The ends were acuminate, and the undulations varied in number from three to fourteen. The length of the undulations was from 1 to 1.8 microns. No definite cellular structure or undulating membrane could be demonstrated, the cell body staining homogeneously; with some showing slight beading or granulations. No spores or flagella were demonstrable. It was Gram-negative, staining only faintly with safranin counter-stain. The organism was non-acid-fast, and stained only faintly with Loeffler's methylene-blue. It stained best with fontana, carbolfuchsin and polychrome methylene-blue stains.

The spirochaetes noted in these patients appeared to be of two rather distinct types. One type was quite thin, delicate and thread-like, with more regular and numerous undulations; the other type appeared coarser, with few undulations and heavier staining.

Active motility of an undulatory character was noted in dark-field preparations of the fresh sputum, which ceased within ten minutes at room temperature (68° F.).

Cultures were unsuccessful by the ordinary aerobic, anaerobic and partial tension methods.

The absence of *Bacillus fusiformis*, usually associated with *S. vincenti*, and the inability to obtain growth in cultures would tend to rule out a Vincent infection. Whether this is a distinct primary species of *Spirochaeta* is questionable.

The continued presence of these organisms in the sputum during the course of the disease, and their rapid disappearance following the intravenous injection of a spirochaetocide, along with the prompt clinical recovery, would indicate their significance as the aetiological factors in these cases. The accompanying bacterial flora remained unaffected by the treatment.

Guinea-pigs and white rats were inoculated with sputum from these patients, but succumbed to

pyogenic affections; and all attempts to reproduce the disease in these animals were uniformly unsuccessful.

The diagnosis of bronchial spirochaetosis is based on the clinical picture, which varies somewhat with the type of the disease, but which in most cases is fairly distinctive, and the demonstration of the organism in the sputum, being careful that the specimen collected is really coughed up from the bronchi.

The disease must be differentiated from influenza, malaria, pulmonary tuberculosis, broncho-mycosis and endemic haemoptysis.

Various drugs have been used in the treatment of this condition, particularly the arsenical and iodine preparations. Castellani recommends liquor potassii arsenitis (Fowler's solution) and the cacodylates. Galli-Valerio recommends arsphenamin. We have found neoarsphenamin effective; and on account of its ease of administration and low toxicity, it seems a desirable method of administering arsenicals.

Farah, in treating the disease in Egypt, used intramuscular injections of iodine with good results. He employed a 54 per cent. solution of iodine in poppy oil.

It would appear that attention should be more generally paid to the presence of bronchial spirochaetosis in this country. In patients with a history of haemoptysis it will relieve the patient's feelings to know that he is suffering, not from the dreaded tuberculosis of the lungs, but from a disease which is much less serious and generally terminates in recovery. A correct diagnosis is also extremely important from the standpoint of the naval and military service, as tuberculosis results in a permanent discharge from the service with a pension, while bronchial spirochaetosis, as a rule, means only a few weeks' incapacity, after which the patient is able to resume his duties.

CONCLUSIONS.

(1) Bronchial spirochaetosis exists in the United States, and is probably more widespread than is generally recognized.

(2) The disease in its clinical aspects is very suggestive of pulmonary tuberculosis, but usually can be readily distinguished from this infection.

(3) The routine examination of all sputum should include a search for spirochaetes, and their presence should be regarded as significant, unless proved otherwise.

(4) The disease appears to be capable of transmission from an infected to a non-infected individual, although the degree of contagiousness is probably slight.

(5) An individual harbouring the spirochaetes in the sputum may present little or no evidence of the disease himself, and it appears that there exist carriers of *S. bronchialis*.

(6) The disease, as a rule, responds readily to treatment, and the arsenical preparations, particularly arsphenamin or neoarsphenamin, are very efficacious.

Colonial Medical Reports.—No. 113.—Shanghai (contd.).

Influenza.—Towards the end of May fifteen cases of "fever" were reported as occurring almost simultaneously among the employees of an office in the Settlement, and this was followed by similar reports in many parts of the Settlement. Some of the cases were so mild that they were ready for work after a day's illness. For a day or two the diagnosis was puzzling, lying between influenza, dengue and some new disease. A big group of police cases under close observation in the Chinese Isolation Hospital enabled a definite diagnosis of epidemic influenza, though somewhat atypical, to be established. And this diagnosis was confirmed when it became known that the Shanghai outbreak was an extension of a world-wide epidemic of influenza. The usual catarrhal symptoms were often absent, except the red fauces which was often marked. A flush over neck and upper part of the chest was commonly observed. There was frequently greenish-yellow viscid sputum, usually showing *Micrococcus catarrhalis* and often the "influenza" bacillus.

The outbreak of influenza beginning at the end of May was responsible for some 152 deaths attributable to influenza pneumonia among Chinese and three among foreigners. This outbreak had subsided at the end of June, to be followed by a similar outbreak in the last week of September lasting till the second week in November, that is, longer than the early summer outbreak and causing a greater mortality: 266 deaths among Chinese and six among foreigners, mostly Japanese, being attributable to influenza pneumonia. A similar double periodicity was recorded in England and India.

At the time of writing this report (December) the records of distribution and case fatality throughout the world are very incomplete. The pandemic appears to have been noticed first in Eastern Europe; in April cases were reported on the Western front; in Spain 30 per cent. of the people were attacked in May; 15,000 cases were reported in Christiania in the middle of June; it occurred in Switzerland from June to August; it affected all Germany, where the epidemic was reported to be at its height in June and July; while in England it prevailed during May, June and July and was again epidemic in October and November; in October it was raging in very severe form in South Africa; in Japan it was severe in November; in both North and South America it was reported in August, and spread from East to West of the United States in September and October, causing great consternation in San Francisco in November.

Accurate data are seldom available in China, but reports of prevalence in epidemic form have been received from most centres. In October it was prevalent simultaneously in many parts of the provinces of Kiangsu and Chekiang. In some of the Chekiang villages mortality was so high as to suggest the probability of infection taking place direct from lung to lung in a similar manner to pneumonic plague.

Epidemic influenza has been known as Chinese

influenza, Russian influenza, and the present as Spanish influenza according to the locality where prevalence was first especially noticed.

Tuberculosis.—Tuberculosis will become extinct when every case is known and properly controlled, and the most important contributor will be education. Every case of open tuberculosis, that is to say, every case with cavities, which emit tubercle bacilli, is a danger to the public unless carefully instructed, controlled and frequently examined. Not only is infection emitted in coughing and sneezing but even in speaking. The danger of a consumptive infecting others in the overcrowded houses of Shanghai is very great. Before any great improvement can result this danger must be understood by the whole community. It frequently happens that the household is infected before even the original case has been recognized as one of tuberculosis. There is an opportunity for saving thousands of lives in Shanghai in this direction.

Plague.—The year under review has been the second in succession during which a complete absence of plague-infected rats and of human cases may be recorded. The danger of introduction of plague-infected rats is, however, greater than ever. On two occasions during the year ships from Bombay and Hongkong respectively brought plague cases to Shanghai. Hongkong, Singapore, Penang, Colombo, Bombay and Calcutta, all in direct shipping connection with Shanghai, have had plague cases arising during the year, so that the need for further measures against rats on ships from these ports is more necessary than ever if Shanghai is to be kept free from plague.

The fortunate absence of plague among rats, due without doubt to the energetic measures taken since their first discovery in Shanghai in 1908, and the operation of the new Building Rules requiring solid ground floors, absence of hollow ceilings below the first floor and no hollow lath and plaster partitions has enabled a considerable reduction in expenditure to be made on measures taken against plague by the Health Office.

But the plague situation was entirely overshadowed by the dire threat of pneumonic plague from the north during the early months of the year.

The epidemic in Shansi and contiguous provinces was reported to have appeared towards the end of November, 1917, somewhere in the neighbourhood of Patsebolong in South Mongolia, in the vicinity of the Yellow River, whence it extended to Paotu and Saratsi in December, being carried by the wool-carters from Mongolia, reaching the important trading centre of Kweihwa by the end of the year. From Paotu it spread south of the Yellow River, reaching Siaoanor about the middle of December. There was no traffic down the Yellow River on account of ice. From Kweihwa it spread during January to Fengchen (the rail-head of the Peking-Kalgan Railway), and from there was carried by the merchants from the Suiyuan district to Tatung, Soping, Pienkwan, Shochow, Taichow, and down the mountain passes almost to the gates of Taiyuan in mid-Shansi. From Taichow it reached Ping-

shanhsien (near the Chenting-Taiyuan Railway) and Tingchow (on the Peking-Hankow Railways) in the province of Chihli early in February. From the important centre of Kweihwa, whence trade routes radiate in many directions, it spread extensively some 200 miles east and about the same distance south. Special measures were taken on the Peking-Kalgan Railway, which pretty effectually protected Peking, and on the Taiyuan-Chenting Railway, which is not known to have brought infection on to the Peking-Hankow Railway. That railway was, however, infected by traffic along the mountain roads through the Yen Men Pass from Taichow, and a long section of the line was closed to local passenger traffic. The measures taken on this line seem to have been effective enough to keep Hankow clear. But some remarkable long distance sprints succeeded in bringing infection down the Tientsin-Pukow line to Fengyang (Anhwei) on February 5, Tsinan on February 11, and Nanking on March 8. This seriously endangered the populous and overcrowded centres in the lower part of the Yangtsze valley. By this time, however, the return of spring-like weather helped to prevent further spread. These long distance infections serve to show the enormous potentialities of spread once railways are reached by persons incubating plague.

The origin of the Shanse epidemic closely resembles that of the great Manchurian epidemic of pneumonic plague of 1910-11, which was first observed in the middle of October in Manchouli in North-west Manchuria, near the Siberian border, being carried by the Chinese Eastern Railway and reaching Harbin by the end of October. Harbin became a focus of the disease from which, after a considerable interval, Changchun and Mukden on the South Manchurian Railway were infected at the end of the year, leading to its further spread to the provinces of Chihli and Shantung. Where still present the epidemic ceased synchronously at the end of March irrespective of sanitary measures. The carriers of the plague in the Manchurian epidemic were those engaged in the fur and wool trade as in the present Shanse epidemic.

The source of the infection in the case of the Manchurian epidemic was practically traced to the tarbagan marmot (*Arctomys bobac*), a large animal of the rat tribe whose fur is much sought after as a lining for winter coats. This corresponds to the plague infection of the ground squirrel of California and of the common rats in so many ports all over the world, to which the infected rats have been carried by ships. The sequence of events seems now to be proved that bubonic plague in man is only got by proximity to the rodent, the actual carrier from rodent to man being the flea. All outbreaks of bubonic plague give rise to a number of cases of secondary pneumonia, as an extension of septicæmic infection, and these, under suitable conditions of proximity and atmosphere, give rise to cases of primary pneumonic plague which, breeding true, may, by droplet infection from the respiratory tract, light up an epidemic of exclusively pneumonic plague.

The vast sandy wastes beyond the northern border of China may be considered for practical purposes a potential endemic plague-infected area, where plague infection is ever present somewhere or other among certain rodents, leading to a danger of human infection when least expected. Hitherto stress has been laid on the tropical home of plague, mainly bubonic; but the menace of the north is more sinister, threatening and elusive. Pneumonic plague, the most deadly of all diseases, exceeds the bubonic form in intensity of virulence and capacity for rapidly destroying man.

As regards Shanghai, danger from shipping from Tientsin never seriously threatened. The soldier infected Tientsin-Pukow Railway, on the other hand, through leakage of the northern quarantine, possibly at Fengchen, was responsible for the spread of infection to Fengyang (Anhwei) on February 5, Tsinan on February 11, and Nanking on March 8. Rumours of plague at Pengpu (near Fengyang) were heard about the middle of January, and the telegram of January 19 from the Military Governor of Kiangsu for an interview to advise on plague measures may be attributed to this. During this visit to Nanking from January 23 to 25, the plague situation was discussed with General Li Shun, Military Governor of the Province of Kiangsu. It was arranged that the Governor would collect information from official sources as to plague cases and particularly as to preventive measures taken at the points of danger; that this information would be communicated to me in Shanghai so as to furnish data for the formulation of such preventive measures as may become necessary; and that close touch would be maintained so as to place our special technical experience freely at the Governor's disposal for such mutual benefit as would result from preventing the spread of pneumonic plague to this province.

Between March 8 and 22 nineteen cases of pneumonic plague were authenticated by the foreign doctors in Nanking, the plague bacillus being found in some specimens of the sputum. These occurred in connection with a case in a tailor's shop at work on clothing for the soldiers in Anhui; and were mostly limited to a small area in the central district of the city. It is probable that the infection was introduced by those who conveyed this clothing. The outbreak was reported to me on March 18. Steps were immediately taken in Shanghai which would lead to the early discovery of cases and isolation of cases and contacts. Facilities were afforded for taking specimens of sputum from suspicious cases and deaths for examination in the laboratory. A special daily inspection was placed on lodging houses, &c. A number of suspected cases were taken under observation in the Isolation Hospital. Arrangements were made for house to house inspection in case of any localized outbreak. Notices in English, Japanese and Chinese were available, giving such instructions as would be useful to residents, particularly advocating the use of the Mukden plague mask when in danger. Demonstrations in all the Branch Health Offices

and many public places and schools were given in the use of the mask, and concerning the nature of the disease and how to prevent it. A large number of masks were made wrapped in a cover giving printed instructions for use. These were distributed freely and afforded a pattern which could be easily copied.

On March 20 a meeting of the Health Committee was held to co-ordinate effort to prevent the introduction of pneumonic plague and to deal with it if introduced. Upon invitation there attended representatives of the French Municipal Council, the Customs, Shanghai-Nanking Railway and the Yangtze River Shipping Companies. The Shanghai-Nanking Railway arranged to suspend all passenger traffic between Nanking and Chinkiang; while the River Shipping Companies agreed to discontinue all passenger traffic, up and down, from Nanking and from all places of call between Nanking and Shanghai and Nanking and Wuhu. The Committee also directed that the so-called Plague Bye-laws, which were passed in November, 1910, and subsequently approved by the Diplomatic Body subject to certain amendments, should be applied, if necessary, to pneumonic plague, including contacts; that is to say, compulsory powers of isolation of cases and contacts should be enforced as the only way of effectively dealing with the emergency. As a result of this meeting the Plague Prevention Committee inaugurated under the Consular Body in 1911 was also brought together again.

The same night, on the urgent request of H.B.M. Consul in Nanking at the instance of the foreign medical men there, I went to Nanking, where I spent the following day, March 21, investigating the plague situation, and suggesting measures of prevention at an interview with the Military Governor Li Shun. On the day after my visit the last case of pneumonic plague was reported. But this happy result must be attributed almost entirely to the efforts of foreign doctors in Nanking in compelling attention to the extreme danger of the outbreak and to the warmer weather, which appears to have a greater effect in stopping the spread of pneumonic plague than such sanitary measures as are applicable at the present day in China. Not only in Nanking, but in Fengyang and Tsinanfu it has been reported that cases were few and contacts and opportunities of spread many. The conditions of extreme overcrowding in the intense cold of the north, where people hive into tightly shut rooms and lie cheek by jowl on the heated k'ang, seem to be the cause of the intense contagion which only occurs in the north. Cases of pneumonic plague occur in all bubonic plague epidemics, but it is seldom that they give rise to epidemics of exclusively pneumonic plague away from climates intensely cold.

The altruistic action of the Shanghai-Nanking Railway Company and of the River Shipping Companies without doubt greatly reduced the danger of Shanghai being infected.

This ready help voluntarily given at considerable

financial loss, together with the enthusiastic and unremitting work day and night of the Health Office staff and the co-operation of the Police and Public Works Department, greatly mitigated the anxiety and stress of a particularly dangerous period.

Danger from Yellow Fever.—The danger of the possible introduction of yellow fever into China is in nowise reduced. World charts of the endemic areas of yellow fever and the distribution of *Stegomyia fasciata*, the known mosquito carrier of yellow fever, show China to be threatened from both east and west; that is to say, from Central Africa, and especially from Tropical America. The danger of yellow fever alone is sufficient to justify mosquito reduction operations in Shanghai.

RESOLUTIONS OF THE INTERNATIONAL SANITARY CONVENTION OF PARIS (1912) ON THE SUBJECT OF YELLOW FEVER.

Yellow fever is spread by the transmission of the virus of yellow fever from the sick man to the healthy man by the intermediary of the *S. calopus*.

In countries where *S. calopus* is not found, yellow fever never develops into an epidemic.

In countries where *stegomyia* is found, yellow fever may be introduced by (a) persons attacked with or passing through the period of incubation of the disease; (b) by infected *stegomyia*.

The period of incubation for yellow fever does not exceed six days. The sick person can be considered as infective only during the first four days of his illness.

During the first four days of his illness the patient should be protected from mosquitoes.

Stegomyia-infected ports provided with a rational sanitary organization against yellow fever have nothing to fear from the introduction of persons who are attacked with or in the incubation stage of yellow fever. The principles of such an organization are to-day well established, and instances of their satisfactory application are numerous.

There are no recorded observations which justify a definite statement that merchandise comprising foodstuffs plays a part in the transport of *S. fasciata* to a distance.

Ships which frequent ports infected with yellow fever can receive and carry infected *stegomyia*.

There is not recorded any undoubted instance of the transport of yellow fever over a great distance by a vessel on board of which there has not occurred during the voyage any "sanitary incident" justifying the suspicion of the existence of yellow fever.

Vessels that visit countries where yellow fever exists should be equipped in such manner as to prevent possible the existence of *S. fasciata*. In a general way, all measures intended to free vessels from *stegomyia* should be considered also as diminishing the chances of diffusion of yellow fever.

Stegomyia on board vessels can, in practice, be destroyed by sulphuration.

Malaria.—A comparatively small number of cases of malarial fever, mostly of the benign tertian type, are contracted in and around Shanghai.

Every effort should be made by householders to do away with all receptacles of stagnant water where mosquitoes breed, such as ponds, water plants, drains out of repair, abandoned tubs, tins and what not. The mosquito net should be assiduously used wherever there are mosquitoes, and especially in up-country houseboat trips. It is doubly necessary to surround a person suffering from malaria with mosquito netting to prevent mosquitoes being infected and acting as carriers of infection.

Beriberi.—The cases of beriberi in the Municipal Gaol have been kept under close observation with a view to the discovery of the real cause of the disease. No definite conclusions have been able to be drawn from the vermin-proofing of the gaol. During the past year the vitamin theory of the cause has been accepted as a working hypothesis, so as to give the patients every possible benefit of the doubt, the use of unpolished rice being general throughout the gaol. That the year has shown a great reduction on the incidence of 1917 cannot be taken to establish the truth of the theory, as a similar sequence of incidences has been noted when no such change of diet was made. An entirely open mind is being kept; and, were a series of years now to follow with a material reduction in the number of cases, it would tell in favour of the vitamin theory.

Rabies.—Eighteen persons were bitten by rabid dogs within the Settlement during the year and subsequently underwent the Pasteur treatment.

In addition ninety-three persons bitten by dogs found not to be rabid came to the Health Office for advice. This very large number of dog bites shows how indifferent the public are to the proper muzzling of dogs. Shanghai is not a suitable place for keeping dogs. It is recommended to increase the licence fee to five dollars.

Cattle Plague.—Cattle plague broke out in seven widely separated dairies during the year and killed ninety-two animals, as compared with a loss of 322 last year. It was found that the outbreak followed the introduction of new stock. This would point to special care being advisable to place new stock in quarantine for an extended period and testing their infectivity by keeping well-grown calves in contact with them.

Kölle and Turner's simultaneous method of immunization by virulent cattle plague blood and immune serum can be recommended as producing a greater degree of immunity than the gall method, but its application is more difficult and there may be some loss of cattle either as a direct result or from inoculated Texas fever. There seems little doubt that were dairymen to have their cattle thus immunized they would be saved subsequent financial loss from outbreaks of cattle plague, but the results have not been uniformly successful.

Public Health Laboratory.—The matters under investigation have been the causes of variation in

virulence of small-pox vaccine, cholera antitoxic serum, the natural filtration of water through alluvium, the suitability of fruits and vegetables as media for the growth of certain pathogenic organisms, preventive inoculation against cattle plague, the causation of beriberi, the incubation period of the rabies in China, the prevalence of Malta fever, the natural disposal of organic matter in house refuse and the purification of water-closet sewage.

Pathological Diagnosis.—The diagnostic service is being well utilized, not only by local medical practitioners, but by those in other parts of China.

Regarding the Wassermann test, which is now available in the laboratory, it may be recorded that it is not infallible; it may be negative when syphilis exists, and in some cases the reaction may be doubtful. Nevertheless it will detect the disease in the vast majority of cases. Hand in hand with diagnosis by this test goes treatment with the arseno-benzol group, which promptly removes the mucous lesions of syphilis and, as an inevitable consequence, reduces the chances of a case infecting others even though he may not be himself completely cured.

Anti-rabic Treatment of Pasteur.—Since the opening of the Shanghai Pasteur Institute in 1899, 662 persons have received the treatment. Among these there were eight deaths from hydrophobia, a mortality of 1.21 per cent., eliminating those who failed to complete the treatment properly, and who developed hydrophobia within fifteen days after the completion of the treatment which cannot be charged to its failure, but to want of time to establish immunity.

During the past year fifty-eight persons underwent the Pasteur treatment, of whom twenty-four were bitten by dogs proved rabid by inoculation tests, seven were certified rabid by veterinary surgeons or medical practitioners, and the remainder were strongly suspected of rabies. Ninety-three other persons bitten by dogs were attended to, but in these cases the Pasteur treatment was not considered necessary.

Three deaths from hydrophobia occurred amongst those treated. One, a little girl, was very severely bitten on the nose, head, and also in the hand, and no efficient treatment of the wounds was attempted until she arrived at the laboratory two days later. She succumbed four days after completion of the full course of injections. In the second case the patient was a small boy who was severely bitten on the knee; in spite of a strong warning, the child's elder brother took him home shortly after beginning the treatment, and did not return until three days later; he then completed the full course of injections, but died twenty-seven days later. The third case, also a small boy, did not begin treatment until five days after receipt of his injury, which consisted of a very severe lacerated wound involving almost the whole length of the arm, practically untreated locally until arrival in Shanghai; this patient succumbed five days after completion of his treatment.

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POLICE HOSPITALS.

Indian Police.—In all the cases of typhoid fever, obvious breaches of the Public Health Rules, such as consumption of unboiled milk and unsterilized vegetables and fruit, were found on investigation of the origin. Venereal disease was less, more use being made of the opportunity given for prophylactic treatment. This is not at present compulsory, but men who contract venereal disease and have not availed themselves of prophylactic treatment lose their pay while off duty. Tuberculosis of the lungs was the chief cause of invaliding out of the service.

Chinese Police.—Tuberculosis was the chief cause of invaliding out of the service. Much of the sickness was due, as in the case of the Indian Police, to preventable intestinal infection. The amount of venereal disease is excessive, but the Chinese police will not voluntarily submit themselves to measures of prophylaxis in operation at the hospital.

Chinese Prisoners.—Eight cases of acute amebiasis were successfully treated by emetine; but two chronic cases died.

Gaol.—Unpolished rice is now used solely throughout the gaol, and the addition of 2 oz. of rice bran for those prisoners showing any suspicious sign of beriberi. It would be too early to draw any definite conclusion as to the effect of the use of unpolished rice, as similar sequences of years during which beriberi cases were very numerous followed by years of comparative absence without any such change of diet are recorded. Overcrowding has still further increased, while vermin-proofing of cells and disinfection of clothing by steam has continued.

That both the outbreaks of influenza penetrated to the prisoners in the gaol, causing 100 cases and four deaths from influenza pneumonia, calls for further preventive medical work as regards the examination and quarantine not only of prisoners on admission, but also of warders and others who come into proximity with the prisoners. As regards the comparative infectivity of influenza and scarlet fever, it is interesting to record that no case of scarlet fever has ever arisen in the gaol.

The number of deaths from lung tuberculosis has still further increased. A series of observations of Pirquet's tuberculin cutaneous reaction on prisoners, who showed no clinical sign except loss of weight, pointed to over 70 per cent. being infected with tuberculosis. Measures adopted to prevent the spread of tuberculosis in the gaol are: examination of all newly admitted prisoners, followed by isolation of all actual and suspected cases, and regular weekly examination of all prisoners losing weight, followed by isolation of all suspected cases for at least one week, during which time records of temperature are kept, sputa examined for bacilli, and tuberculin tests made. Every prisoner is medically examined at least once a month. The opening of the new block of 960 cells in the near future should diminish the excessive incidence of lung tuberculosis.

SANITARY INSPECTION.

By means of a system, inaugurated ten years ago, of examinations in public health work as applicable locally, health inspectors, recruited locally, are being suitably trained for health work. A knowledge of the Chinese language by the foreign sanitary staff is compulsory, being essential for the conduct of health work among the Chinese population and for the proper control of the large Chinese staff. As regards general qualification, it is recognized that a sanitary inspector is greatly handicapped in his work unless he has tact, courtesy and patience. Working with a population in which Chinese so largely predominate, and where the foreign community is made up of so many different elements, much health work remains pioneer work, and calls for initiative on the part of each member of the foreign inspecting staff.

Branch Health Offices.—Vaccinations are done weekly during the proper season; public health notices are distributed; inquiries are answered; deaths and cases of infectious disease may be reported and health talks are given weekly. These offices are organized to meet considerably more than the public demand of them. Each household should get into touch with the Health Inspector of their district. The more the public requires done for them the better the Health Inspector will be pleased, and the better equipped will be the Health Offices. We are the servants of the public and, so far as they will permit, their teachers in preventive health measures.

Public Health Notices.—A translation of the Public Health Notices into Japanese has been made for the benefit of the Japanese community. A booklet in English and Chinese giving a simple account of the causation and prevention of tuberculosis of the lungs is available for distribution. A notice in English and Chinese giving information regarding rabies is also available.

Lectures.—A Chinese of the educated class or a doctor is provided for each district to lecture on health matters once weekly at each Branch Health Office. The subjects taken are those appropriate to the season, such as the notices dealing with vaccination and small-pox, plague prevention by rat-proofing houses and rat destruction, scarlet fever, tuberculosis, cholera, mosquito reduction and general preventive measures. At many of the native schools the same lecturer gives short lessons to the pupils by arrangement with the schoolmaster, and is generally well received. These "Health Talks" for Chinese at the Branch Health Offices and Schools reach some 3,000 persons each week and are gradually instilling the sanitary idea. Much more is hoped for in the future as lantern slides, pictures and models become available.

Chinese Dwellings.—The main requirement at the present time is action to prevent houses being made insanitary by alterations subsequent to being passed by the building surveyor, e.g., by removing the stairs and placing them in the backyard, the latter being covered over and used as a kitchen, and the kitchen as an additional sleeping room or

let to another family; covering the front yard over thus interfering with proper ventilation; erecting partitions, lofts and sleeping stages, thus providing rooms without windows, without light or ventilation, veritable death traps where contagion is inevitable; boarding over the drying stage to make an additional room. All this and more is done to allow more people to occupy the house so as to raise enough money to pay the rent. Most houses are occupied by two or three families. The Chinese tiled roof is insanitary because it tends towards plague through harbouring rats. Especially in Shanghai, where overcrowding is so intense, is a flat roof desirable where people can take the air and sleep out on hot nights. A flat roof would also probably have the great advantage of being rat-proof.

Foreign Dwellings.—Refugees from Russia, including Armenians, Roumanians and Czechs, have in many instances led to dangerous overcrowding, especially in boarding-houses.

The attention of architects is called to the clauses in the Public Health Notice headed "Kitchen," wherein it is recommended that every house should, if possible, have a serving-room adjoining the dining-room and separate from the kitchen. The serving-room should be fitted with a washing-up sink, germ-proof filter, shelves for all the table utensils, groceries, &c., and room for the ice-chest. It is held that the separation of the serving-room from the kitchen is an important means of preventing those food infections which are so prevalent in Shanghai, and which are brought into a house chiefly by infected vegetables. Cooking destroys the infective material, so that food that leaves the kitchen should reach the table without contamination. This can be ensured by having table utensils kept in, and the service of food done from a serving-room kept quite separate from the kitchen. The serving-room should be rather a part of the dining-room than of the kitchen. As an additional safeguard a place for the washing and preparation of vegetables prior to cooking may be provided in the yard outside the kitchen. A great number of foreign houses lack a proper serving-room and use the space under the staircase for that important purpose. This space is usually too small, dark and ill-ventilated, and is often without a washing-up sink. The wooden zinc-lined sinks are frequently abominable, and glazed earthenware sinks with proper waste pipes of lead should replace them.

Most foreign houses, including recently erected big blocks of offices and flats (not reinforced concrete), are infested with rats and, should plague become prevalent, may become a source of great danger. In these houses the gratings under the ground floor are generally found loose or broken, so that the interior of the house is easily accessible to rats, which then make use of all the hollow spaces which ceilings and lath and plaster partitions provide. It is advisable to have the ground floor as far as possible solid. The floor of the kitchen, larder and outhouses should be solid and of cement if possible. Lath and plaster partitions should be avoided, but if used may be made fairly rat-proof by

being constructed solid for about a foot from the floor, as rats generally obtain access by gnawing through near the floor level. Reinforced concrete construction is particularly suited to local conditions in view of the special need for rat-proof buildings.

The absence of any special reference to lath and plaster partitions in the Building Rules is a grave sanitary defect. These hollow partitions result in practically every new dwelling house not of ferro-concrete construction being soon overrun by rats. The small additional cost of solid partitions or the occlusion of the portion near the floor and ceiling by some rat-resisting material would compensate the tenants by the freedom from such troublesome parasites as rats, without considering the plague danger. As regards hollow ceilings there is a tendency towards solid floors and flat roofs in modern building construction. It will become more and more evident as time goes on that building rules are defective which do not build rats out of all buildings.

House Refuse.—The disposal of house refuse is beset with difficulties, but they have so far been satisfactorily met. Owing, however, to the great increase in the population the difficulties of safe disposal are increasing. Prior to 1909 house refuse was all barged away beyond Settlement limits, but the large quantities which were dumped into the Whangpoo and the Soochow Creek led to justifiable complaints from the Harbour Authorities. Since then great improvement has been effected mainly by developing a demand for house refuse for agricultural purposes and by using the burnt-out remains of refuse heaps for raising low land mainly as an anti-mosquito measure. At the present time all house refuse, amounting to some 130,000 tons annually, is either disposed of to country boats as a manure or used for raising low land. What is wanted are several sites where refuse can be stored for two years; that is to say, until it has had time to purify itself, when it can be used for almost any sort of raising purpose and particularly for gardens. As the banks of the Soochow Creek are getting rapidly built up, it is becoming increasingly difficult to obtain dumping sites near enough to give the boats time to return to the shoots by the next morning. The quantity of refuse that has to be dealt with during the summer months (when there is no demand from up-country for agricultural purposes) is enormous. It may become advisable to have refuse destructors, especially in the neighbourhood of the Hongkew Creek, where there are fewer facilities for disposing of refuse by boat on account of the difficulty in navigating refuse boats on the Hongkew Creek and the Whangpoo river. However, a destructor leaves some 30 per cent. of ash still to be disposed of, and cannot be compared to the present method for purposes of economy, costing some 50 cents a ton for disposal as against 4·2 by the present method.

Owing to increasing difficulties with the unloading staff and in the finding of suitable dumping sites after a period of ten years development by departmental work, during which a demand for refuse for

agricultural purposes was created and its legitimate use for raising purposes within the Settlement established under suitable restrictions, a reversion was made to the original plan of requiring the contractor to provide dumping sites and unloading staff. This, owing to the development made during the intervening period as to proper disposal of refuse, has resulted in greatly improved work at a reduced cost. Increasing difficulty is, however, being met with from the native small officials when it becomes desirable to dump refuse outside the Settlement.

House Refuse Receptacles.—Primarily as a plague preventive measure, in order to limit the food supply of rats, 5,646 house refuse receptacles, rat- and fly-proof, have been erected during the past seven years. After years of experiment, the form of receptacle now erected appears to fulfil its object best. The Chinese like them and mostly use them instead of throwing their garbage outside their doors, so that in all save the worst neighbourhoods a marked improvement in the cleanliness of alleys is found. It is apparent that rats will thus be deprived of a vast store of nourishment, and, as the rat population is to a large extent regulated by the amount of the available food supply, this is held to be a radical plague preventive measure. There are, however, too many cases where the Chinese fix open the self-closing lids and will not take the trouble to place their house refuse within the receptacle. This entails a large number of prosecutions; but the punishment inflicted by no means puts a stop to the insanitary practice—in sanitary both from the point of view of fly-carried disease and of plague. A notice in Chinese has been stencilled over these receptacles on the wall telling people to put refuse inside the receptacle and to keep the lid shut.

Mosquito Reduction.—A special staff was organized which worked from the middle of March until the end of October. The work of the Chinese staff required very careful foreign supervision, as the results of good work were not directly apparent and the detection of bad work required assiduous care on the part of the foreign inspector. As good a class of coolie as possible was obtained, and fines inflicted on finding mosquito larvæ in places recently worked through. The coolies worked in couples in an area exactly delimited. Each area was further subdivided into seven for each day in the week and a time-table kept, so that it could be known exactly where each mosquito couple was working at any time. The inspector accompanied and gave detailed instructions to each pair of coolies early in the season and made written notes of those unusual places where stagnant water was likely to be found, such as Chinese gardens, empty houses, defective paving, gullies in unfrequented places, &c., i.e., those places which were likely to be beyond a coolie's intelligence to think of or beyond his courage to enter; these places subsequently received the special attention of the inspector. Persuasive methods are theoretically very excellent, but it is found in practice that nothing short of making mosquito breeding a punishable offence will

succeed in making mosquito reduction work in Shanghai quite satisfactory.

Flies.—The fly contaminates food with its feet, and is a germ carrier of the most pestilent kind. Against what has been truly described as "the deadly house-fly," the careful collection and disposal of house refuse is a measure of primary importance. Among other public measures has been the requirement as one of the conditions of licence, in premises licensed for the purpose of safeguarding the food supply, of adequate means being taken to prevent the access of flies to food-stuffs by the use of perforated zinc in windows and spring slam doors. This screening against flies is also an important individual measure and should be applied to the serving-room, kitchen and servants' latrine; while cleanliness should be maintained in and about the house, so as to deprive the insect of food and of breeding-places. The provision of 5,646 fly-proof cement and iron refuse receptacles throughout the Settlement had for one of its objects the diminution of flies.

Laundries.—All the laundries within the Settlement are licensed and regularly inspected. The system of sanitary control has been one of frequent inspection, so as to make the licencees reluctant to transgress the terms of their licences, rather than one having for its object a large number of prosecutions.

Lodging Houses.—The native lodging houses and hotels have been regularly inspected and those of the lower class periodically disinfected, and permanently rat-proofed.

Water-closets.—Professor Gilbert J. Fowler, D.Sc., visited Shanghai during part of the months of May and June in order to advise what method of disposal of water-closet sewage was best adapted for local conditions. Briefly, the upshot was that, as a demand for water-closets was inevitable, in order to safeguard the water supply, it was advisable to have a separate sewage system for water-closets, which, by means of ejectors, would bring the sewage to a purification works where it could be treated by the "activated sludge" method. This method consists in blowing air in a fine state of division for a few hours through the sewage contained in a tank, which purifies by rapid oxidation through the medium of the suspended matter in the sewage previously activated by bacterial growth. Such matter, on the cessation of blowing, rapidly subsides as sludge. This sludge has a considerable value as a fertilizer, and is calculated to give back to the farmer much of that which he loses by not receiving nightsoil. The effluent is inoffensive and may be discharged into the stream, which furnishes the source of our water supply, with a reasonable degree of safety.

As Professor Fowler's scheme is incomparably better for the safe disposal of water-closet sewage than the use of "septic tanks" in connection with individual water-closet installations, and as the expenditure involved, though great, seems not more than so progressive and important a community can bear, it was considered expedient to definitely

prohibit "septic tanks," although Professor Fowler considered that they might be used under certain conditions. But now that a separate sewage system with purification works is considered the best for local conditions by the sewage expert and also by the local public works and public health administrations, it seems better that effort be concentrated solely on the best plan without distraction along less efficient alternatives.

Ordure Removal.—Difficulties were again met with during the year in effectively disposing of nightsoil. Exceptional cold during the early part of the year made the country boats ice-bound in the small creeks and unable to come to Shanghai to purchase fertilizer. Apart from this, crops were reported to have been destroyed, lessening the demand for fertilizer.

As regards the disposal of water-closet cesspools, the contractor is under agreement to empty and dispose in the same way as nightsoil. Diaphragm suction pumps and hose have been supplied by the Health Office, while the contractor supplied hand tank carts. These latter will be replaced as soon as possible by the two 1,000-gallon motor tank wagons ordered from home four years ago and by a petrol motor wagon now being built by the Public Works Department, into whose hands this work will be turned over. The revival of indigo culture, due to no artificial indigo coming from Germany, is a bull point for nightsoil, as indigo appears to require much of this fertilizer.

The value of water-closet sewage for manuring rice, cotton, indigo and other crops is without question. The strength of the fertilizer is such that it can be applied directly and frequently to crops during periods of drought. The main difficulty is transport and absence of regular demand.

FOOD.

As the preventable diseases specially prevalent in Shanghai are mostly caused by infected food, food inspection has been considered of paramount importance.

The periodic analyses of water supply by the Shanghai Waterworks Co. show that filtration is, as a rule, carefully done. In view of the greater possibilities of contamination of the water supply greater attention is being given to biological tests of the water in the laboratory.

There has been a progressive improvement in the quality of milk supplied. The standard of cleanliness in dairies has been maintained. The windows of the milk rooms are required to be unopenable and provided with perforated zinc instead of glass and the door with a spring slam to prevent ingress of flies. Water supply from deep wells giving an approved supply of sterile water is now permitted in dairies in outlying districts.

Close supervision has been exercised over aerated water factories and places where ice-cream and iced drinks are made. A large number of samples were submitted to examination in the municipal laboratory, and, especially in the case of ice-cream, a large proportion were found unfit for consumption.

The sale of these articles by itinerant hawkers should not be permitted. The making of sterile or safe ice-cream is a matter of careful supervision. There has been an improvement in the purity of aerated water since this supply has been mainly in the hands of foreign manufacturers.

The licensed butchers, poultry, game and vegetable shops have been kept in good sanitary condition. The regulation of fruit shops has presented great difficulty. Endeavour has been made to get the dealers to keep thin-skinned fruits in fly-proof cases, but with indifferent success.

Thirty-two thousand four hundred and fifty-four pounds of unsound fruit, vegetables, &c., were seized, and destroyed after confirmation by a magistrate and the Health Officer. The native ice-cream and cool-drink dealers have received the attention of the inspectors. The sale of cut melon has been discouraged.

Food Hawkers.—A notice was posted in all the markets on April 1 to the effect that an additional dollar monthly would be charged for licence fee for hawking on the streets certain foods which were considered liable to endanger health. The usual hawker's licence fee has been two dollars monthly for some time. The notice specified the food-stuffs considered dangerous, and included fruit, melon, loo-sok and sugar-cane. The consumption of such uncooked articles is considered one of the main causes of cholera and choleraic diseases. The measure was recommended solely for the improvement of general health conditions. A short time previously there had been a disturbance among the rishia coolies; that is to say, among the same class which furnish the street hawkers. On May 1 a crowd, ostensibly consisting of hawkers, gathered together, their main objective apparently being the Branch Health Offices at which hawkers' licences were issued. In several of these the mob proceeded to break the glass, &c. An attempt, partially successful for a day or two, was made to prevent market produce coming into the Settlement and being sold. It was felt that as hawkers had no stock-in-trade or premises to keep up they could gradually replace the selling of dangerous foods by that of the far more numerous safe foods, so that the lives of hundreds of people might be saved. A certain measure of sympathy went out to the hawkers, who were probably quite unaware of the harm they do by selling dangerous food; there being no desire to deprive anyone of legitimate livelihood, it was considered expedient not to go on with the tax, but to protect public health by further instruction of the public as to which foods are safe and which dangerous.

The examination of cattle and carcasses at the municipal slaughter-house affords adequate protection of the meat supply.

Good meat is stamped with a circular stamp for beef and a triangular stamp for mutton, pork and veal, with the words "Killed municipal slaughter-house" and the date of slaughter. Meat inferior in quality, but free from disease, passed for sale on stalls only, is marked "second quality."

Colonial Medical Reports.—No. 114.—New South Wales.**REPORT OF THE DIRECTOR-GENERAL OF PUBLIC HEALTH FOR THE YEAR ENDED DECEMBER 31, 1917.****By ROBERT T. PATON,***Director-General of Public Health.*

As indicated in my report for 1916, the health legislation of this State requires considerable amendment to bring it into line with the more advanced health laws of progressive countries in other parts of the world.

The Public Health Act of 1896 (consolidated in 1902) was framed more or less closely on the English public health laws of 1875; and in England it has been found, in common with our own local experience, that existing codes of health laws are neither practically efficient nor sufficient for the purpose intended, and do not now yield all that is expected by the public from health administration.

The Health Acts of this State suffer to some extent from want of administrative elasticity to meet changing conditions. Legislation is needed which will give power to make regulations to meet emergencies or new conditions as they occur. Particularly is this power necessary in regard to the control of recently introduced or new forms of disease. Events frequently happen necessitating immediate action, but the Department is hampered through want of legal authority. Legislation is required which will give the Board of Health power to advise the proclamation of any illness as a "dangerous, infectious, or contagious disease," and for such proclamation to then confer authority upon the Department for compulsory removal to and detention in hospital, where necessary, in their own or the public interest, of persons suffering from diseases of the nature referred to; also for the examination and control by authorized medical officers of "carriers" of the germs of infectious diseases, or of the contacts of persons suffering from such diseases, and for the isolation of such persons where necessary for the public welfare. The control of "carriers" is a new feature so far as legislation in this State is concerned, but the provision exists in the Victorian and New Zealand Health Acts, and is believed to be working satisfactorily. The purpose sought is, of course, to minimize the risk of such "carriers" infecting other persons. In certain diseases "carriers" constitute a grave menace to the public; particularly is this true of "carriers" of diphtheria who may infect a whole school; the same remark applies to typhoid fever "carriers," more especially if such persons are employed in handling milk or other food liable to convey infection.

Power is also required for the destruction of animals (including insects) suffering or suspected to be suffering from any disease liable to be transmitted or conveyed to man. This would give greatly extended powers for the control of rats in relation to plague prevention. It also has an important bearing in regard to control of bilharziosis, a disease which is being introduced to Australia by men returning from active service in Egypt and other parts of Africa who have become infected there. The intermediate host in this instance is a snail. Persons suffering from bilharzia are frequently not prevented by the disease from following their ordinary occupations and earning a livelihood, but they need to be kept under surveillance in order that measures can be taken to prevent spread of infection from them. Power is needed to make ankylostomiasis (or hookworm disease) and similar diseases notifiable without imposing all the restrictions necessary in regard to acute infectious diseases. Ankylostomiasis is caused by a minute worm which inhabits the small intestine. It mainly affects persons in contact with damp earth (as, for instance, miners), and usually gains entrance to the body through the skin of the feet and legs. This disease can only be spread by soil pollution from the bowel discharges of infected persons. It has caused an immense amount of sickness and distress amongst miners in other parts of the world, notably in the U.S.A., and in Germany. Miners in Queensland suffer in this way, and there is, therefore, a danger of the disease being introduced into this State. An extensive inspection of the sanitary conditions prevailing in coal mines in the Newcastle district was carried out during the latter half of 1917 by the Acting Medical Officer of Health for the Hunter River Combined District (Dr. Booth-Clarkson). The object of the inspection was to ascertain whether any conditions obtained in the mines which might facilitate the spread of the disease among the miners should any infected person reach the district. I am able, fortunately, to report that there are no indications of the disease having reached the State up to the present. Inquiries were widely instituted among the medical practitioners and the hospitals in the Newcastle and Maitland mining districts, and failed to discover the existence of any case, or suspected case; special bacteriological examinations were carried out with

similar results. The inspection revealed, however, that sanitary conditions in some of the mines were far from satisfactory, and this has resulted in action being taken for the general improvement of the sanitary arrangements in mines in view of the possible danger of introduction of this very serious disease into the coal mines of the State.

Power to make regulations is required prescribing the precautions which must be taken by persons suffering from ankylostomiasis, bilharzia, or similar diseases, and by the proprietors of mines, factories, or other places where persons so infected are employed, in order to prevent spread of such diseases.

Apart from the points to which attention has been invited above in regard to provision of greater powers for dealing with public health matters, the necessity for consolidating the health laws of the State is urgent. Already we have nearly a dozen separate statutes dealing with health, food, and sanitation. This multiplication of statutes, and codes of regulations under so many Acts, is, to say the least, troublesome, and greatly increases the work of administration. It is also apt to lead to confusion or misinterpretations when legal proceedings are taken. The public health service more closely affects the lives of the people than does any other branch of public administration, and it is essential that the laws to be administered should be clear, and of such a nature as to most effectually secure the purpose for which they were drafted.

VENEREAL DISEASES.

The Department continued throughout 1917 to give very earnest consideration to any measures which gave promise of aiding in the suppression, control, or cure of these very grave illnesses.

Preventive Measures.—Posters and pamphlets containing advice for the avoidance of infection and for securing treatment were prepared and distributed.

Treatment.—In the metropolitan district a considerable step forward in providing treatment was made in April, 1917, when, after a controversy extending over several months, the Sydney Hospital overcame the difficulty of finding accommodation, and opened a night clinic, thus relieving somewhat the pressure on the only night clinic hitherto available—namely, that at the Royal Prince Alfred Hospital. But, unfortunately, this latter hospital has found it necessary to very considerably curtail its activities. In 1915 the cases under treatment at the Royal Prince Alfred Hospital were limited to 500; however, the demand for treatment was so great, especially in the case of male patients, that the numbers under treatment rose in 1916 to nearly 800. With the medical staff then at its disposal the hospital authorities found it impossible to treat so many patients without serious inconvenience, and the number of active cases under treatment was reduced first to 400, and later to 200, at which it still remains.

This demand for treatment at night clinics bears

out my previously expressed opinion—namely, that the greatest obstacle to the effective control of venereal diseases in the metropolitan district, is the difficulty in securing a sufficient number of conveniently situated clinics for the treatment of infected persons; not in inducing such persons to seek treatment when it is available to them under conditions which ensure a reasonable degree of privacy.

The following return shows the number of venereal cases under treatment at public hospitals during 1917:—

Indoor: Males, 978, females, 331 Outdoor (night clinics); Males, 1,123; females, 290. Total attendance of outdoor patients.—16,777.

The following review of the position at the end of 1917 in regard to the legislative and other provision in this State for dealing with venereal disease will no doubt be of interest to the public:—

Early in 1917 all public subsidized hospitals were advised that drugs, free of cost, would be supplied on condition that any person applying for treatment of venereal disease should receive such treatment without charge.

For the quarter ended September 30, 1917, 110 public hospitals furnished returns, 92 had no venereal disease patients, while 18 dealt with 69 patients.

Prince Alfred Hospital, during 1917, treated 89 male and 273 female venereal indoor patients, and for the whole year the clinical outdoor department dealt with 694 male and 224 female patients, involving over 15,000 attendances.

The clinic at Sydney Hospital, which opened on April 24, 1917, treated 429 male and 66 female patients up to the end of the year. The attendances numbered close on 1,700.

The State hospitals—Coast, Rookwood, and Liverpool—treated 659 male indoor patients, while Newington had 58 female patients under treatment.

The necessity for suppressing and prohibiting quackery, and advertisements by persons professing themselves capable of curing these diseases, is imperative, and recommendations for an amendment of the Medical Practitioners' Act have been urged.

The Prisoners' Detention Act of 1908 provides that where the surgeon of a prison certifies that a convicted prisoner is suffering from a venereal disease, such prisoner may be detained in a lock hospital—declared as such by the governor. The period of such detention may exceed the term of imprisonment.

Regulations under the Pure Food Act, 1908, preclude the employment of any person suffering from venereal disease in the manufacture, preparation, storage, packing, carriage, or delivery for sale of any food or drug, or of any article used or intended to be used as a food or drug.

Under the Public Health (Amendment) Act, 1915, a regulation provides that if the proprietor of any factory or business in which any operation of preparing or packing food for sale is carried on,

becomes aware, or has reasonable grounds for believing that an employee is suffering from any venereal disease, he shall immediately report the fact to the Board of Health.

PREVENTION OF CANCER.

Whilst the advances made in medical science steadily reduce the annual number of deaths from such disease as small-pox, tuberculosis, typhoid fever and diphtheria, it has so far been ineffective in the prevention of cancer, one of the most feared of all illnesses. This disease persistently shows a larger number of victims, the death-rate from it being on the increase in all countries from which returns are available.

Cancer is a disease which develops in later life—sometimes in middle life. This is evidenced by the Government Statistician's figures for 1916 (the latest complete returns available), which show that of the 1,491 persons who died from cancer during that year, 95 per cent. were 35 years of age or over.

Cancer research committees have been formed in all parts of the civilized world, and numbers of scientists have devoted their lives to studying the disease; but knowledge of its specific cause is still lacking, and successful measures for retarding its progress are still being earnestly sought for. Early removal of the affected tissues is the only known cure at present; and it is a well-established fact that numbers of persons who die each year from cancer might have been saved had they received surgical treatment in the earlier stages of the disease. In the hope of reducing avoidable suffering and mortality, the Department is issuing a poster, directing attention to the earliest manifestations which may indicate commencing cancer, and to the importance of seeking early advice and treatment.

TUBERCULOSIS.

Administrative work in connection with the treatment of consumption is still severely handicapped by the lack of hospital accommodation in the Metropolitan District for advanced or seriously ill tubercular patients. The provision of a consumptive hospital of 300 beds in the vicinity of Little Bay is a matter of the greatest urgency, not only in the interests of the patients, but more particularly to protect the public from the likelihood of infection from contact with persons expectorating tubercle bacilli. Consumption can be limited if properly controlled by the provision of sufficient and suitable accommodation for patients in different stages of illness.

The Medical Superintendent of Waterfall Sanatorium (Dr. Palmer) reports that treatment at Waterfall has been the same as in past years. Although from time to time many new methods of treatment are announced and reported to work

wonders, when put to the test he finds they generally prove to be useless. In Dr. Palmer's experience, the only method that really yields permanent results is properly regulated treatment in a sanatorium, and in his opinion even this can never be satisfactory so long as the principle that only suitable cases should be admitted is disregarded. A sanatorium should be also a training school in hygienic principles, and this most important health factor is lost if patients are not admitted in the early stages of their illness.

Proper State control of consumption is an urgent public health question, and much better results would be obtained if the present agencies were increased. At Waterfall there are chronic, hopelessly advanced cases, and a minority of curable cases. Chronic cases should be admitted to a special hospital such as is proposed to be established at Little Bay.

In several publications recently received from England and America, special articles are devoted to problems arising in connection with the hospital treatment of consumptives, and in each the point specially emphasized is the urgent need of hospital accommodation for advanced cases in order that sanatoria may be put to their legitimate use as treatment and curative establishments.

A recent issue of the *Lancet* has special articles dealing with tuberculosis under the headings, "The Provision of Hospital Accommodation for Advanced Cases," "The Grading of Institutions for the Tuberculous," and "The Economic Classification of Tuberculosis," and each writer emphatically states that the greatest present need is sufficient hospital beds for advanced cases, in order that early and hopeful cases can be sent to sanatoria already in existence, but overcrowded with hopeless cases. This bears out our experience at Waterfall.

The *Lancet* writers estimate that 30 per cent. of all new cases of pulmonary tuberculosis require sanatorium treatment for an average period of six months, with subsequent treatment at a farm colony in a third of the cases. An experiment with farm work will, it is hoped, be undertaken at Waterfall during 1918.

No matter of public health administration demands more urgent or immediate attention than does that of providing additional accommodation in the vicinity of the Coast Hospital for advanced cases of tuberculosis, in order to relieve congestion at Waterfall, and more particularly to permit the beds at Waterfall being put to their proper use in accommodating patients with prospects of recovery. I sincerely trust that financial conditions will permit of some definite action being taken in the matter at an early date.

Broken Hill.—No suitable hospital exists at Broken Hill for treatment of patients suffering from consumption, and arrangements have been made with the South Australian Government for sanatorium treatment in that State of Broken Hill patients suffering from tuberculosis, at a fixed cost. The arrangement is working satisfactorily.

THE COAST HOSPITAL.

The outstanding feature of the year's work at the Coast Hospital was the considerable increase in the daily average number of occupied beds, which was 533 in 1917, as compared with 472 in 1916, or an average daily increase of 61. The greater facilities of transit by means of motor ambulances has led to the Coast being more and more utilized as a general medical and surgical hospital, the increase in the numbers for this year being wholly due to an increase in such patients. There was a gratifying decrease in the number of beds required for infectious diseases, as is evidenced by the figures given below:—

Year	Scarlet fever	Typhoid fever	Measles	Mumps	Total
1916 ...	1,095	87	209	230	1,621
1917 ...	759	19	138	173	1,089
Decrease ...	336	68	71	57	542

There was a slight increase in the number of diphtheria patients.

The New Coast Hospital Buildings.—The three large and handsomely equipped units of the New Coast Hospital were placed in commission early in the year. This increased the accommodation in the general division by eighty-four beds.

New (Infectious) Military Hospital.—During the year the New Military Hospital, consisting of four wards of twenty-five beds each, with nurses' quarters, was completed, and put into use.

The cultivation of the land for the production of vegetables was further extended with satisfactory results, and about fifteen acres are now in use for reproductive purposes for hospital supplies.

DAVID BERRY HOSPITAL.

From the report of the Secretary, the number of patients treated has been steadily maintained, the total for the year being 199, as compared with 206 during 1916. One hundred and sixty-three patients were discharged cured, and fifteen relieved. There were ten deaths. The hospital records show that the benefits of this hospital are not confined to the Berry district, but are available to South Coast residents generally, there being numerous admissions from Gerringong, Kangaroo Valley, Nowra, and Milton.

LADY EDELINE HOSPITAL FOR BABIES, VACCLUSE.

There were 241 infants under treatment during 1917. A new ward containing twenty beds—named the Rosalind Black Ward, in memory of the late Mrs. George Black—was opened during the year, and adds considerably to the facilities for treatment of the little patients.

Many of the babies admitted to the hospital are sent in through the different baby clinics, which are doing most excellent work in the more thickly populated districts in instructing and assisting mothers in the care of their babies.

CONVALESCENT HOSPITALS FOR MEN AND WOMEN AT EASTWOOD AND ROSE BAY.

These hospitals continue to prove a boon to persons slowly regaining health after protracted illness or serious operations.

In the Strickland Convalescent Hospital for Women, "Carrara," Rose Bay, 610 women benefited greatly by a stay of from two to four weeks, their general health showing rapid improvement as a result of the rest and change in the pleasant surroundings of this hospital.

The 254 male patients admitted to the Denistone House Convalescent Hospital, at Eastwood, were also greatly benefited by their stay. The patients are admitted from all the Metropolitan hospitals, the majority being convalescent medical and surgical cases. The usual stay at Denistone House is four weeks, but extensions are granted where necessary.

STATE HOSPITALS AND ASYLUMS.

The State hospitals and asylums include some of the largest institutions in the State, and have a regular inmate population ranging between 3,000 and 4,000 persons distributed between Rookwood, Liverpool, Newington, and the Parramatta Homes. For some years the policy of the Department has been to make the institutions self-contained as far as possible, and inmates who are sufficiently well are encouraged to assist in the farm operations and in the workshops, for which they are paid a small daily wage. Dairy-farming, pig-raising, vegetable growing and poultry keeping comprise the larger outdoor activities. At Liverpool State Hospital, 120 acres of good farming land have recently been purchased, from profits arising from the piggery; part of this area will be used for dairying and another part for orchard purposes. At the Newington State Hospital, a large area of swamp land has recently been reclaimed; and the Department is indebted to the Harbour Trust for this considerable increase in the area of land now available for farming and dairying operations.

Indoor activities at the institutions comprise the making of bread, boots and clothes, as well as a great deal of carpentry, painting, plumbing and other general repair work.

PRIVATE HOSPITALS ACT, 1908.

There are now 571 premises licensed under this Act, of which 191 are in the Metropolitan area and 380 in the country. Of the total number 380 are licensed for the reception of lying-in cases only; seventeen for medical and surgical cases, and 174 for both medical, surgical and lying-in cases.

Applications for licence or renewal of licence have been the subject of careful inquiry both as to the suitability of the premises for a private hospital, and as to the character and qualifications of the applicant. This latter aspect has been more than ordinarily difficult, owing to the absence of so many trained nurses on war service.

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The consequent shortage has rendered necessary a temporary relaxation in some instances of standards of qualifications; but even where special circumstances justified a concession being made to applicants who were not fully trained, such concessions were limited by the duration of the war. Attention is again drawn to the erroneous interpretation in country districts of Section 17, under which many persons believe they can conduct a private hospital without licence, provided they do not receive more than two patients in any one month, or more than six in the course of a year. Section 17 is a definition clause and is only applicable to legal proceedings. The Act provides that not even one person can be received for treatment, attendance, or care, at a charge, unless the premises have been approved by the Board of Health and a licence issued to the resident manager.

Work under this Act has been carried out by Dr. Kate Knowles, who joined the staff as Temporary Medical Officer, on the appointment of Dr. Chapple as second Government Officer for Sydney.

PURE FOOD ADMINISTRATION.

The Pure Food Act of this State, although capable of improvement, is one of the most efficient of our health laws, and is strictly enforced. Adulterations or any sophistications of food, fraudulent or misleading labelling, unclean or dangerous methods of preparation, and even deteriorations and accidental contaminations, are subject to prosecution. Standards have been set up for all the common articles of food, and are strictly adhered to.

The Act became law in 1908, and in the course of ten years certain minor weaknesses, from an administrative point of view, have been discovered; these it is proposed to remedy at an early date by an amending Bill, in which more extensive powers are sought for controlling the advertisement and sale of quack nostrums and appliances, in order that the public may not be misled by exaggerated or false statements as to the curative effects of such preparations. Provision is also necessary for registration of premises used in connection with the manufacture, preparation, or storage for sale of food or drugs, in order that these may be more effectively controlled.

A very considerable amount of routine work was carried out by this branch during the year.

NEGLECT OF PURE FOOD ACT BY LOCAL GOVERNMENT BODIES.

I wish to call attention to certain provisions of the Local Government Bill, which, if passed into law, would seriously affect the administration of the Pure Food Act by this Department, and result in confusion from overlapping and duplication of control.

From 1910 to the present date some 140 officers employed by local authorities have been authorized by the Board of Health to take samples and other-

wise carry out certain provisions of the Pure Food Act in the districts in which they are employed. The apathy and neglect of most of them in this important matter is shown by an examination of the report of the Chief Food Inspector, which discloses that of 138 officers so authorized, 78 did not take even a sample of milk during the year; while 23 took less than twenty-five samples.

CHEMICAL LABORATORY.

The Government Analyst's report shows that during the year 11,585 samples were analysed; of these 8,856 were samples of milk, and 784 samples of food other than milk. The percentage of adulterated milk samples varied from 4·6 in metropolitan districts, to 6·8 in country municipalities; and in other country districts rose to 14·8. In the Government Analyst's opinion the large number of adulterated samples from these latter districts is due to less frequent inspection, and evidences the need of additional country inspectors. From troopships 230 samples of food were taken and analysed; the quality of the food supplied shows steady improvement, and the adulterations have fallen from over 20 per cent. in 1915, when samples were first taken, to 5·6 per cent. in the present year.

One hundred and thirty criminal investigations were made on behalf of the police, and there were thirty-one examinations of human viscera in connection with deaths from unknown causes; 1,715 samples of goods and materials were tested from different branches of the public service. Three hundred and sixty-four examinations were made for the Pharmacy Board in connection with its endeavours to prevent the sale of poisonous mixtures by unlicensed vendors.

Attention is called by the Government Analyst to the dangerous practice of selling poisonous fluids such as disinfectants and soldering solutions in bottles originally (and still bearing the old original food labels) used for food such as beer, vinegar and cordials. The Department is seeking legal power to make this dangerous practice punishable.

MICROBIOLOGICAL LABORATORY.

There has been a marked increase in laboratory work during 1917.

In 1916 the examinations were 8,407, and rose in 1917 to 11,001. This increase was due to a general advance in all classes of specimens received, and not to the undue prevalence of any particular disease, such, for instance, as diphtheria. The number of throat swabbings examined for this latter disease showed a slight increase—namely, 3,086 in 1917, as against 2,663 in 1916. There was no special epidemic prevalence of this disease, so that these numbers represent the swabbings submitted during a diphtheria year which bridges the interval between epidemic years. The number of specimens of sputa submitted for examination for tubercle bacilli was 2,240, a slight decrease on the number (2,456) examined in 1916. The importance of these examinations, both for the sake of the patient

and for the public at large, can hardly be over-estimated.

The number of specimens of blood submitted from suspected cases of typhoid fever fell from 901 in 1916 to 666 this year, and it is interesting to note that there have been fewer typhoid cases during 1917 than at any time in the twenty years since the disease was made notifiable. The campaign against venereal disease led to an examination of 1,914 specimens of blood for the reaction for syphilis as against 1,019 in 1916. The number of slides examined for gonorrhœa (594) also shows a slight increase. The importance of such examinations in preventing spread of these infections is very great, the results of the examinations indicating whether or not energetic treatment is still necessary to effect a cure.

Specimens submitted from cases of suspected meningitis numbered 167, little more than half those submitted during 1916 (313), indicating a distinctly lessened incidence of the disease.

Plague Prevention.—The usual systematic examination of rats for the purpose of getting early information should plague again reach Sydney, has been continued. The number of rats examined during 1917 was 8,231, compared with 7,943 in 1916. Fortunately, no rats were found infected with plague, thus leaving a plague-free period from April, 1910. The methodical examination of the rats around the wharves of Sydney and in the city itself constitutes one of the surest measures for preventing the establishment of an epidemic of plague in our midst, should the disease unfortunately be re-introduced.

Anti-typhoid Vaccine.—During the year about 80,000 c.c. of anti-typhoid vaccine was prepared and supplied, chiefly to the military authorities. The value of this protective measure is hardly realized by the general public. Few of our country towns, in which typhoid fever is yearly epidemic, have accepted the offer of the Department to supply sufficient anti-typhoid vaccine to protect all the inhabitants of the district.

Vaccine Treatment of Septic Conditions, &c.—In addition to the more important items mentioned above, a large number of vaccines for curative purposes are prepared annually at the request of medical practitioners.

Pathological Work.—A large number of tissues are regularly examined for detection of cancer or other disease processes. Foods and disinfectants of various kinds are submitted from time to time for bacteriological examination.

X-DISEASE.

During the year a number of cases of a disease with high mortality, resembling somewhat cerebrospinal meningitis, were reported from various north-western and western towns.

Medical officers from the Board of Health visited Broken Hill, Bourke, Walgett, Narrabri, and Warren, to co-operate with the local medical men in suppressing the outbreak.

Unfortunately, owing to the erratic appearance of cases of the disease and their occurrence so far from Sydney, great difficulties were experienced in getting suitable material for investigating the nature of the disease. Eventually a considerable amount of material was obtained by the Principal Microbiologist for special investigations with a view to establishing the diagnostic features of the disease, and if possible of preparing a curative serum or vaccine.

SMALL-POX.

The epidemic of mild small-pox continued in the State during 1917, but was almost entirely confined to towns in the western district. The most seriously affected of these was the town of Warren, from which sixty-six cases were notified. The various local authorities in this town deserve congratulation for the effective manner in which they dealt with the disease without asking very much help from this Department, beyond the occasional visit of a departmental medical officer to the town.

Towards the end of the year infection was re-introduced from one of the western towns into the Maitland mining districts, and some fourteen cases resulted. The type of the disease showed no variation from the mild form in which it has shown itself throughout the epidemic, and no deaths were recorded from it.

NOTIFIABLE INFECTIOUS DISEASES.

During 1917 all notifiable infectious diseases showed decreasing incidence. Scarlet fever diminished very much, and infantile paralysis almost disappeared; as previously stated, cerebrospinal fever decreased by more than one-half as compared with 1916. The number of cases of typhoid fever were lower than in any previous year since notification came into force in 1898. Diphtheria alone continued to be prevalent, but even this disease showed a decrease of over 10 per cent. upon the notifications of the previous year. There was very little decrease in the number of cases of tuberculosis notified.

SUBDIVISION OF COUNTRY DISTRICTS FOR HEALTH CONTROL.

It has for many years been the intention that in addition to Newcastle and Broken Hill the more populous country districts in the State should be divided into areas and placed under control of a medical officer of health, specially trained in sanitary law and administration. The war has hitherto prevented this supervisory scheme being put into operation, but as soon as medical men are released from active service it is hoped to carry it out.

PUBLIC HEALTH AND SANITARY ADMINISTRATION.

Garbage Disposal Problem.—As usual a great deal of attention has been devoted to the treatment of municipal garbage. This question is a perennial

one, and year by year nuisances are complained of in one municipality or another owing to the prevalence of obsolete and objectionable methods of dealing with house and street refuse. The City of Sydney and some other municipalities in the metropolitan area have installed modern refuse destructors for the incineration of garbage. But I regret to report that most of the other municipalities in the area are still attempting to dispose of their accumulations of house refuse by dumping at depots where the garbage is very frequently imperfectly covered or safeguarded against the production of nuisance arising from decaying matter. Owing to local conditions the inherent difficulties of dealing with refuse of this sort are very marked in some of the south Sydney municipalities, and resulting conditions are so objectionable that the Board of Health issued formal legal notices to a number of municipal councils situated in this part of the metropolitan area requiring them to either instal efficient destructors or otherwise provide satisfactory means within a year of disposing of their garbage. Groups of municipalities are now co-operating with a view to the early erection of up-to-date garbage destructors to jointly serve their districts.

A couple of municipalities in the metropolitan area installed an apparatus for the crushing or pulverizing of garbage. The actual operation appears to be free from any nuisance; there is no smoke; very little dust, and little if any smell outside the building in which the garbage is treated. The process is a noisy one, and could not be carried on very near dwellings. The final produce of the process is a coarse, dark-coloured granular material with an odour of garbage (but less marked than in untreated garbage); it is, however, liable to ferment, and if allowed to accumulate in large heaps exposed to the weather, becomes very offensive. Generally speaking, however, it is less offensive than untreated garbage and is oxidized much more rapidly. If the results of this process are deposited in thin layers and covered by a light coating of sand or other friable soil, no nuisance should be created. This method of treating garbage is on its trial, but it is not considered likely that it will prove as satisfactory as incineration.

Health Matters in Country Towns.—The department has, throughout the year, continued the sanitary inspection of country towns. The local authorities are advised as to the conditions found, with such comments as are considered necessary, and recommendations made for improvements.

In respect of three large towns in the State the sanitary conditions were found to be so unsatisfactory that proceedings in the Supreme Court were threatened against the local authorities, the ultimate result being that the department's demands were carried out without recourse to law.

Sanitary Conveniences on Ferry Steamers and Wharves.—Local authorities under the existing Public Health and Local Government Acts have no control over ferry steamers and wharves and, consequently, could not enforce the provision on them of proper or sufficient sanitary conveniences.

This matter has been a constant source of annoyance to and complaint by members of the public; and of anxiety to the Department. Regulations are necessary giving power in regard to provision, construction and maintenance of such conveniences, in all places at present outside the jurisdiction of local government bodies.

Interment of the Dead.—From time to time complaints are made of nuisance arising from delay in carrying out burials. The only powers at present possessed by the department are in relation to persons dying of notifiable infectious diseases. Interment of the dead as soon after death as practicable is necessary. Conveyance of dead bodies by railway trains or other vehicles should be controlled. Power to regulate both these matters will receive early attention.

Disinfection.—Under existing laws the department has no control over the method of disinfection of premises where infectious diseases have occurred. When performed by private persons it is frequently carried out in such a manner as to make it practically useless. This defect it is hoped will be remedied in the near future.

Hairdressers and Barbers' Shops.—Proper cleansing and disinfection of tools and appliances in barbers' shops, and for the sanitary inspection of such shops, is necessary. The need for such control is generally admitted, but so far as is known such legislative action has not hitherto been taken in Australia, although it exists in other parts of the world.

COUNTRY HOTELS AND SANITATION.

I am able to report that the sanitary conditions found in country hotels, which formerly were often deplorably bad, are steadily improving.

For several years the Department of Public Health has made a practice of detailing travelling inspectors to visit country hotels, ascertain their sanitary condition, and furnish reports thereon. When the premises or their sanitary appurtenances are found to be defective, representations are made to the Department of Justice, and, unless the defective conditions are remedied by the proprietors, the report is submitted to the licensing bench. Beneficial results have almost invariably followed this procedure, for most of the licensing magistrates have shown themselves willing to assist the Department by intimating the withholding of licences unless the required improvements are made. The Board of Health is well aware of the unusual difficulties which beset the licensed victuallers as a body at this time, and is exercising its powers of enforcing improvements with such leniency as it considers warrantable; but the requirements of the public health are paramount, and the Board is determined to exercise its powers to the fullest extent whenever the circumstances require such action.

DAIRIES SUPERVISION ACT, 1901.

As mentioned in my report for 1916, the Dairy Industry Act, 1915, administered by the Depart-

ment of Agriculture, came into operation in 1916. It was found that the execution of Acts relating to dairies by two Departments occasionally gave rise to complaints of overlapping of inspection, and different instructions for carrying out improvements. As it was thought possible that those engaged in the dairy industry might be subjected to unnecessary expenditure in case of doubt as to which Department's instructions were to be complied with, the matter was submitted to the Crown Solicitor, who advised that the operation of the Dairy Industry Act, 1915, is confined to the control of dairy produce factories and stores, and that in all other respects the powers of the Board of Health in regard to registration, inspection and supervision of dairying premises and of dairy cattle, are not interfered with, and remain in exactly the same position under the Dairies Supervision Act, 1901, as hitherto. To further remove any possibility of friction, a conference of dairy inspectors was held with a view to evolving a uniform method of dairy and slaughter-house inspection, and of drawing up model plans for construction of dairies and slaughter-houses.

LEGAL REGISTRATION OF NURSES.

It has been recognized for some years that nurses should be registered by an authorized Board, and a Nurses' Registration Bill has been prepared, and is awaiting Parliamentary sanction. At present there is no law compelling the registration of nurses in New South Wales. Trained nurses are largely controlled by a body—the Australasian Trained Nurses' Association—which works in conjunction with branches in Queensland, South Australia, Western Australia, and Tasmania. These States all work under the same rules, conduct the same membership examination simultaneously, and have one register and one monthly journal in common. This Association has no legal standing, but its good work is recognized by the Government, which insists that matrons of country hospitals which receive a subsidy from the Government must be registered by the Association.

MEDICAL WAR MEASURES.

Coast Hospital.—By request of the Military authorities arrangements have recently been made at the Coast Hospital for treatment of wounded men from the Front.

Noxious Microbes Act.—On the recommendation of the Military, several licences for the keeping of noxious or dangerous microbes were withdrawn during the year.

MEDICAL REGISTER.

During the year the names of alien medical men who are not now resident in New South Wales, or who have been interned, were removed from the register of medical practitioners.

Other Names removed from Medical Register.—The names of four other practitioners who had been found guilty of infamous conduct in a professional respect were also removed from the register.

APPRECIATION OF STAFF.

I cannot speak too highly of the loyalty of my staff during this time of stress. Practically the whole of the staff who were unable to enlist assisted very materially with war work in one direction or another, in addition to carrying out their official duties most faithfully. The women members of the staff have collected considerable sums of money for various war funds, and have rendered material assistance in other ways. They have, in addition, contributed much to the comfort of those at the Front by regularly sending letters, literature, and parcels.

Inadequate Accommodation for the Head Office Staff.—I cannot close this report without again drawing attention to the inadequate housing of my staff. The head office staff is cramped for room; inspecting staffs are located outside the building, necessitating a heavy yearly expenditure for rent, and rendering supervision difficult. It is essential that additional accommodation should be provided without delay.

PURE FOOD ACT, 1908.

Regular inspections have been made of premises used in connection with the preparation, sale or storage of foods and drugs for sale, particular attention having been given to bakeries and pastrycook factories; smallgoods factories; cordial and aerated water factories; jam factories; ice-cream factories, &c.; milk distributing depots; butchers' and fish shops; restaurants and refreshment rooms. A very great improvement is noticeable in the methods of manufacture, particularly as regards cleanliness and a better grade of food material. Many factories have been renovated and structurally improved.

Seizure of Food Dangerous or Injurious to Health.—During the year special attention has been given to the examination of foodstuffs stored in wholesale grocery stores, auction rooms, bonds, &c., and large quantities of deteriorated and damaged goods have been seized and destroyed under the provisions of the Pure Food Act, which goods prior to the passing of this Act would have been exposed for sale in public markets and restaurants.

DAIRIES SUPERVISION ACT, 1901.

By direction of the Director-General of Public Health the whole of the Dairies Supervision Staff met together in Sydney during April, and from the 10th of that month to the 16th sat in conference for the purpose of evolving a uniform method of dairy and slaughter-house inspection, of deciding on model plans for dairies and slaughter-houses, and of bringing about a unanimity of opinion in the carrying out of the Acts.

This conference undoubtedly achieved the objects for which it was summoned. In addition, questions of importance relating to the daily carrying out of their duties were freely discussed amongst the staff, and there was a constant exchange of ideas, which cannot fail to bring forth the best results.

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REPORT OF THE CHIEF SANITARY INSPECTOR.

Twenty-nine proposed sites and sixty-six existing nightsoil depots were inspected, resulting in several councils being requested by this Department to prosecute the sanitary contractors for neglect to comply with Ordinances for the proper disposal of excreta and generally allowing filthy conditions to exist. Convictions were obtained on the evidence of the inspecting officer in each case.

One hundred and six garbage depots were inspected, and in consequence of insanitary conditions found to exist, several metropolitan councils have been notified that unless the nuisance is abated by the provision of garbage destructors, incinerators, or some effectual means for destroying refuse without nuisance to the public, legal action will be taken by this Department.

Owing to the fact that many councils do not employ a qualified sanitary inspector, authorization under the Public Health (Amendment) Act, 1915, has only been issued to seventy-two officers to issue closing orders with regard to insanitary buildings. This necessitated the inspection of 141 insanitary buildings by officers of this Branch, and eighty closing orders were recommended. There are 321 local authorities, and 114 now employ qualified sanitary inspectors. The town clerk acts in that position for some councils, others have appointed the nightsoil contractors, the lamplighter, or even the caretaker of the hall, or old-age pensioners.

Forty-two councils receive a subsidy from the Government as part-payment of the sanitary inspector's salary where there is a specified number of inhabitants; the officer appointed must be qualified, and the Board of Health has the right to veto over his appointment and dismissal.

An investigation into nuisance caused by a manure-maker was also carried out for some weeks by officers of the Department.

Investigations into the merits of three patent sanitary apparatus were carried out; and two demonstrations were given to sanitary inspectors and technical college students on steam disinfection of bedding and clothing at the Woolloomooloo depot.

PRIVATE HOSPITALS ACT, 1908.

Notwithstanding the fact that the Act has been in force for so long, instances have not been wanting of neglect or evasion of the requirements of the statute. Where offence has been shown to be due to *bona fide* ignorance of the law, the Board, whilst recognizing that the plea of ignorance in no way constitutes a sufficient legal excuse, has warned offenders, and required them to comply with the Act. In several instances the circumstances have warranted prosecution, and convictions have been obtained.

The Board finds that a very widespread mistake exists throughout the country, persons believing that under the Act they may receive patients with-

out their premises being licensed, provided such patients do not exceed two in any one month, or more than six in the course of a year. This is not so. Nobody may receive into any premises even one patient for treatment, attendance or care at a charge, unless such premises have been approved by the Board, and the person using them has been duly licensed. The misinterpretation of a section of the Act (Section 17) which applies only to the conduct of legal proceeding is doubtless the origin of this erroneous belief, but the law as to licensing is quite definite, and needs to be borne in mind.

Owing to the absence of any serious outbreaks of small-pox, &c., and in spite of a shortage of medical officers, a larger number of private hospitals have been inspected during 1917 than during the four previous years, resulting in correction of many minor faults of management and maintenance which were found to exist.

K. KNOWLES,

Assistant Medical Officer of the Government.

METROPOLITAN COMBINED SANITARY DISTRICTS.

The health experience of Sydney, as gauged by the malidity and mortality returns for the year 1917, may be considered most satisfactory, being the lowest yet recorded for the metropolis. The death-rate was 9.27 per 1,000 of the population.

The deaths of children under one year of age, within the metropolitan area, totalled 1,168, or 58 per 1,000 births. This rate is most gratifying, being the lowest on record, and a drop of 9 on that of the year 1916 (67, hitherto being the lowest rate recorded).

No cases of small-pox were notified from within the metropolitan area during the year.

It is gratifying to report the great decrease in the number of notifications of scarlet fever and typhoid fever compared with the year 1916, that for typhoid fever being by far the lowest recorded. Diphtheria, however, was widely prevalent, although not to the extent of the previous year.

The epidemic of anterior poliomyelitis, which occurred in 1916, practically ceased during the current year, only six cases of this disease being notified.

Fifty-four cases of cerebrospinal meningitis were reported, as compared with 117 in 1916.

SCARLET FEVER.

Scarlet fever was not so prevalent in the metropolis as during the preceding three years, viz., 1,110 cases notified, as compared with 2,468 in 1916.

The attack-rate was 1.44 per 1,000 of the population.

The type of the disease was mild, as there were only nine deaths, giving a case fatality rate of 0.8 per cent.

The death-rate per 1,000 of the population was 0.001.

Scarlet fever was most prevalent during the

autumn and winter months, from March to August. The maximum number of notifications were received in June, and the minimum in December.

DIPHTHERIA.

Diphtheria was slightly less prevalent in 1917 than during the previous year.

The attack-rate was 2.94 per 1,000 of the population, with a case fatality of 3.18 per cent.

The death-rate per 1,000 of the population was 0.09.

The maximum number of notifications received was in the month of April, and the minimum in October.

Investigations were made respecting outbreaks of diphtheria at a boys' school, Parramatta, and also at the Children's Hospital, Camperdown. The latter was one of wound diphtheria for the most part, the first case being identified in a ward used for "septic" cases. The whole of the patients in the ward were affected, and in three other wards partially so, resulting in the notification of over thirty cases. All the inmates were bacteriologically examined, and those found to be positive were removed to the Coast Hospital. Prophylactic doses of antitoxin were also administered, and other precautionary measures taken, such as closure of wards and disinfection, with the result that the outbreak soon terminated.

The mortality-rate of diphtheria has fallen to a gratifying extent since the introduction of diphtheria antitoxin, but the disease itself still remains widely prevalent, and it seems to me will remain so until the problem of "carriers" can be systematically dealt with.

TYPHOID FEVER.

Only 371 cases of typhoid fever were notified during the year, the lowest on record, the previous lowest figures being 610 in 1902. As is usual, the monthly number of cases notified were highest in the summer and autumn months, the maximum being reached in January.

The deaths from typhoid fever totalled twenty-seven, giving a death-rate of 0.04 per 1,000 of the population (the lowest on record). The case-fatality rate was 7.27 per cent. Fifteen cases were traced as due for the most part to milk from a dairy owned by Mrs. D—, who had been previously connected with a dairy outbreak at Botany, and had moved to Ryde subsequently. With the detection and removal of the "carrier" these small outbreaks ceased dramatically. This carrier has been kept under strict supervision by the Department.

TUBERCULOSIS.

The number of deaths from all forms of tuberculosis in the metropolis proper during 1917 was 500, of which 441 were due to tuberculosis of the lungs, 26 to tubercular meningitis, and 33 to other tubercular diseases.

The mortality-rate for pulmonary tuberculosis was highest in the age group of 25-34 years, and

then descended in the following order: 35-44, 45-54, 15-24.

Of the cases notified during the year it was ascertained that 571 were receiving institutional treatment (hospital, dispensary, or sanatorium). It has been proved to be somewhat of a difficult matter to elicit a family history of tuberculosis from cases visited, but in eighty-seven instances it was answered in the positive. Approximately 60 per cent. of the cases notified were between the ages of 25 to 45. The occupation of eighty of the notifications was given as that of soldier.

HUNTER RIVER COMBINED SANITARY DISTRICTS.

There was a total of 321 cases of diphtheria during the year.

The year 1917 was the eighth year during which diphtheria has been prevalent in the district, and it is unsatisfactory to again find that there have been the largest number of cases since 1910, when the number was notified at 373. In the previous five years notifications were as follows: 1912, 177; 1913, 189; 1914, 171; 1915, 233; and 1916, 264.

The largest number of cases occurred in April, May and June, and the smallest in October, November and December, which corresponds very much with last year.

All municipalities and shires reported cases except one.

It is decidedly unsatisfactory to find that diphtheria has again increased in the district, because it probably means an increase of "carriers" as well of cases, and probably, if the whole district could be "swabbed," a much larger number of "carriers" would be found than was expected, in a similar manner that I found 13,000 "carriers" during the Mackay epidemic when it was estimated that thirty or forty would be the limit.

Probably diphtheria bacilli are transmitted by direct contact in nearly every case, but, at the same time, they can be conveyed by any agent which gets into or touches the mouth, and it is well that the public should know that various authorities consider that diphtheria may be conveyed by the following agencies: Lead pencils, drinking cups, lollies, handkerchiefs, public towels, spoons, toys, dirty hands, or kissing; also by the careless use of clinical thermometers, tongue depressors, or other instruments used in the nose or throat. Likewise careless coughing, sneezing, or spitting over books or other surfaces which children touch, or upon food, clothing, tables or bedding, the latter to a slight extent. Milk also may be a means of transmission. If due to a milk supply, the infection may come from bottles infected in the houses of customers, or the infection may exist in some person who handles the milk. Terminal disinfection would not prevent the disease being conveyed to contacts by any of the above.

There was a total of seventy-two cases of typhoid fever during the year.

This is the lowest on record for the district, which

it is exceedingly satisfactory to have to report. The next lowest was 105 in 1915.

As last year, the highest number of cases occurred in January, February and March, and the lowest number in August, September and October.

Anti-typhoid Inoculation.—As it seems very difficult and almost impossible to get people to carry out the requisite precautions in regard to food, milk, water, dust, flies, &c., and as the report of the Medical Officer for London for 1914 shows that there are so many sources of suspicion, I advise anti-typhoid inoculation as much as possible.

It is interesting to note that in the London report referred to it is stated that 400 of the 789 cases notified were ascribed to the following sources of infection, which sources might be kept in mind by sanitary inspectors so far as conditions are similar: Fried fish, 72; shellfish, 88; other fish, 26; water-cress, 22; other food, 19; water supply, 7; drainage, 8; smells, 4; wearing clothes of previous case, 1; contracted abroad, 38; contracted in country, 10; contracted from cases in house, 40; contracted from other persons, 20.

There were ninety-six cases of scarlet fever during the year. This is the lowest on record, and compares most favourably with the number for the last five years.

The largest number of cases occurred in January, April and May, and the smallest number in June and December.

There was a total of sixty cases of pulmonary tuberculosis during the year.

During the previous years the number of cases were: 1915, 11 (in November and December); 1916, 30, as compared with 60 in 1917.

All these cases seem to have occurred in different houses, but in many of them there was a history of infection from some other member of the family at some previous time.

There was a total of fourteen cases of variola during the year.

Incidence.—The year 1917 was the fifth year during which variola has occurred in the Hunter River Combined District.

During the previous years the number of cases were: 1913, 3; 1914, 48; 1915, 400; 1916, 31.

All these cases occurred in July, October, November and December, the larger number of cases occurring in July, October and December.

HISTORY OF VARIOLA, 1916.

There were on January 1 twelve patients in the Hunter River District Isolation Hospital—namely, seven males and five females. This outbreak was considered terminated on the discharge of the last patients on May 16, and the Isolation Hospital was closed for the fourth time on May 31.

Although cases occurred in different parts of the State, no case occurred in the Hunter River Combined District until the one reported to me as occurring at Bellbird on July 11. This case was a woman who had come from the infected district of Collarenebri, and who was in her mother's boarding-house at Bellbird with sixteen other people.

Eventually five cases occurred in connection with this particular person, but it was hoped that the disease had been "scotched," when, nearly a month after the last case was discharged, a case occurred at Sawyer's Gully Post Office. On investigation it appeared that several of this family had had variola-like attacks. This case led to two more, and when they had been dealt with another hiatus occurred when three more cases (relatives of the post office family) occurred in Abermain, and after them another hiatus and three occurred in Kurri Kurri.

Thorough investigations were made by myself, the Local Government medical officers, the police, and the Shire sanitary inspector in regard to these cases, but, except the fact that the members of each of the above groups had caught the disease from the first case that came under notice, there seemed to be no connection between the groups.

As, owing to the strike, there had not been much travelling either into or out of the district, the only reason for the various outbreaks that can be given is that a mild strain had again existed in the district, and so mild a one that a doctor had not been called in. In support of this theory it may be mentioned that all the cases which came under notice had called their physician in for what they considered a very severe attack of influenza or rheumatism. In point of fact, in at least a couple of places the physicians temporarily coincided with this opinion, as two cases were placed in the general hospital wards for treatment, and were only moved into the isolation wards on a rash appearing.

All precautions mentioned in former reports, including vaccination depots, were taken again during this outbreak.

PROMOTION OF EFFICIENCY OF PUBLIC HEALTH WORK IN THE HUNTER RIVER COMBINED DISTRICT.

Rats.—Several reports were sent in during the year in regard to the rat infestation of Newcastle and wharves; the number killed during the year is very small indeed. The condition, therefore, remains very unsatisfactory, and would mean that this district would be in a very bad position in case of an outbreak of plague. In such a case almost the first thing to be carried out in the way of prevention would be a very extensive and organized anti-rat campaign, for at the present one can only say that the rat condition is highly dangerous. Several reports have been sent on the subject to various authorities, but nothing has so far been done. At least one or more municipal rat-catchers should be added to the Newcastle Municipal Staff, and I am communicating again with them later. Trained dogs could probably be got from an adjacent State, and it is certainly desirable that some form of anti-rat campaign should be inaugurated, especially in view of the fact that a serious outbreak of plague is reported from the Asiatic East which might, quite presumably, extend to Australia.

If a rat campaign could once be started it might lead later to rat preventive work being done, such

as concreting the wharves; making business premises and houses and other places rat-proof; placing food materials a certain height (say a yard at least) above the ground, and other measures.

Infantile Mortality.—This rate has been very unsatisfactory in this district for many years, and this seems to be the case in mining districts generally. It is not easy to account for this, unless certain important items of food supply are not as of good quality as in the agricultural districts. Possibly, also, the tendency of miners to buy large amounts of canned foods (of which the infant often gets a share), which are more prejudicial to an infant than the fresh material, may account partly for it. Also, the more irregular hours and disadvantages from constant attendance at picture-shows, racecourses, and other places of amusement.

The largest percentage of deaths is from diarrhoea and enteritis, prematurity and developmental diseases.

It would appear that to lessen the mortality from the above, care and education of the mother are required prior to the birth of the child.

To effect this the same system might be adopted as has been done at St. Helens, Lancashire, England, where pregnancy is made a notifiable condition to be reported to the Health authorities, and a nurse visits the prospective mother at her home and instructs her in regard to the care of her own health and of the baby to be born. The nurse also gives advice to personal and house hygiene, and a printed circular is left.

The above might be made part of the duties of the Baby Clinics nurses, and it would in all probability lead to a decrease of infantile mortality in the Hunter River Combined District.

Malaria.—Though only one case was reported in 1917, there were probably others, though I heard of none that originated in the district. Mosquitoes, however, are a pest and a nuisance, and where they are numerous and irritating must tend to run down resisting powers. Probably, prior to a mosquito campaign, the question of infantile mortality and diphtheria should receive special attention, but it does seem advisable that all hotel and boarding-house keepers should be required to provide mosquito nets and keep them in proper order. This is certainly not done very much in this district, although in many places and at certain times of the year the mosquitoes are a most undoubted pest.

Not long ago I spent eight weeks at an hotel at a time when mosquitoes were peculiarly bad, and the boarders were given a small bottle of kerosene and a rag to rub the kerosene over the pillow and themselves at night, in place of the much-required nets.

These nets are particularly important in boarding-houses and hotels, as it is in such places that persons, owing to general travellers, are liable to be infected with malaria. Circulars might also be issued on the proper methods of putting up and dealing with mosquito nets, as not 1 per cent. of that number are satisfactorily hung.

It might be made part of the duty of inspectors

of boarding-houses and hotels to see what condition mosquito nets are in, and that they are properly hung, for in case of any malaria appearing in a district (leaving out the question of a mosquito campaign) very few, if any, of the few mosquito nets used would be a protection against anopheles.

BROKEN HILL AND DISTRICT.

The incidence of infectious disease during the year and also the death-rate due thereto was gratifyingly low, especially in typhoid fever and diphtheria. It is to be hoped that this improvement continues, and with further improvements to the sanitary system and the avoidance of any disturbance to the same, there is no reason why this should not be so.

During the latter half of March, 1917, we had an outbreak of a septicæmic disease, very virulent and fatal in character. This was very alarming for a few weeks, there being twelve deaths. Dr. Cleland, the principal microbiologist from the Department of Public Health, Sydney, came to Broken Hill to investigate the disease, without any very definite result. Fortunately it died out quickly. A very similar form has again appeared this month (February, 1918), and it is to be hoped that at the worst it will not be more prolonged or more virulent than its predecessor of last year. The chief characteristic of the disease is its sudden onset, with high temperature and mental disturbances, and other symptoms akin to those of cerebro-spinal meningitis; but examination after death shows no signs of brain or spinal cord disease.

OUTBREAK OF MILD SMALL-POX IN NEW SOUTH WALES, 1913-1917.

The epidemic of mild small-pox, which was imported into New South Wales from Canada in 1913, continued, and finally disappeared from the State during 1917. Very full accounts of the epidemic are published in previous annual reports. From many points of view the epidemic has been a most interesting one, and not the least interesting is that which concerns itself with the fact that the disorder has been, so far as is known, entirely confined to the State of New South Wales. The adjoining States of Queensland, South Australia and Victoria, separated from New South Wales by boundaries many hundreds of miles long, have never been invaded, though traffic is unrestricted and practically unwatched all along those boundaries.

During the year 1917, 117 persons were ascertained to have been attacked, bringing the total number of persons attacked in the five years during which the epidemic lasted up to 2,392. In that five years there were no deaths which could be attributed solely to small-pox, for, although four deaths were recorded among those attacked in the earlier part of the epidemic, in each case death was probably due to some other cause than small-pox, and the utmost that could be said was that possibly small-pox was adjuvant to the fatal termination.

Colonial Medical Reports.—No. 114.—New South Wales
(continued).

During 1917 cases were almost entirely confined to the north-western districts of the State, the only exception to this statement being a small outbreak of fourteen cases in the Newcastle district (Shire of Cessnock). Into this district a fresh infection was introduced from a town in the north-west during July, and, before the outbreak could be smothered, fourteen persons had been attacked.

The type of the disease remained constant in all respects to that observed during previous years. There was no change, either sudden or progressive, in either the character or severity of the symptoms. In respect of danger to life or the health of the individuals attacked, the disease was certainly no more dangerous than ordinary chicken-pox, but in the more severe cases the scarring left after recovery was more marked, and, in some instances in which the face had been a good deal affected, the pitting was sufficiently severe many months after recovery to seriously affect the good looks of the patient.

Isolation and vaccination of contacts were the measures relied on to smother the outbreak in each invaded centre. In addition, a general vaccination of the public in the vicinity of each focus of attack was freely encouraged. These measures were rapidly successful everywhere. The local hospitals were in all cases utilized for the isolation of the sick.

WATERFALL STATE SANATORIUM.

I have to report that during the year 1917 there were 508 male and 296 female patients under treatment. Of this number 222 male and 117 female patients were in residence on January 1, and 286 male and 179 female patients were admitted during the last twelve months.

During this period 337 patients were discharged, and 159 deaths occurred.

Of the remainder, 60 male and 44 female patients had the disease arrested, having no signs of active disease, and able to do moderately heavy work. Beside these, 61 male and 31 female patients were much improved and able to return to ordinary life.

Of the remainder, 60 male and 44 female patients were somewhat benefited by their stay here, while 47 patients showed no apparent benefit.

The treatment carried out was mainly that of the open-air treatment, combined with dieting, rest and moderate exercise. As was the case in the previous year, very few patients were suitable for the tuberculin treatments, but where suitable such methods were used.

The results for the year show a remarkable resemblance to the results of each of the previous four years, and conclusively demonstrate the absolute importance of getting consumptives early, if treatment is to be satisfactory and successful. Notwithstanding the vital importance of this fact,

and the frequency with which it has been publicly proclaimed, no comprehensive attempt has yet been made to discover, and collect for treatment, consumptives in the early and incipient stages.

The methods of to-day are practically those of fifteen years ago, though certainly provision is made for the treatment of a greater number of patients. To be satisfied with such rudimentary methods is absurd, when one considers what the ravages of this disease mean to the economy of the State. That our present methods are not satisfactory has been proved the whole world over, and it is because these methods are only elementary that people have come to consider tuberculosis incurable.

If we ever hope to treat this disease more satisfactorily, we must make use of the experiences gained and knowledge obtained from our own efforts in the past, and with it combine and adapt the scientific facts and principles obtained from research work and systematic organizations, as carried out in such cities as Edinburgh and Baltimore.

We know that any method to prove satisfactory must deal thoroughly with large areas. To even get early cases we must not be satisfied with a few here and there, but must aim at getting all suitable cases throughout the whole State. We must treat each individual, and train them how to deal with their own case, and if necessary, provide them with the means of doing so. We must control the sources of infection, and cease the wasteful methods of treating good and bad cases together. The public also must be forced to understand, in a rational way, what consumption is, wherein its danger lies, and the vital need for early treatment.

Our own working conditions do not conform to such a scheme, for the preponderance of hopeless cases greatly interferes with our success.

ROOKWOOD STATE HOSPITAL AND ASYLUM FOR MEN, LIDCOMBE.

The specialized departments under the care of the Honorary Medical Officers have again reached a high state of efficiency, and special thanks are due to these gentlemen. Tests of sputa, blood, &c., have been carried out by the Microbiological Department, and also the preparation of pathological sections, bacteriological tests, vaccines, &c. Sydney Hospital has undertaken all X-ray work and also the radium treatment of cases.

As in previous years all new admissions (unless contra-indicated or recently done) have been vaccinated before being transferred to the general hospital wards.

The death-rate for the year (480) has been the lowest for a number of years, the average age of the total deaths being 67. The average age of those dying from senile decay was 74 years.

During the year a nurse or attendant has been placed on the continuous day duty in each hospital

ward. This has resulted in a marked improvement in the conduction of the wards and in the continuity of the treatment of the patients, the latter being impossible under the pre-existing system of frequent changes to night duty.

In view of the large sum disbursed monthly to inmates in the form of Old-age or Invalid Pensions (over £100) allowances, and gratuities to working inmates (£150), I would recommend for the consideration of the Department the advisability of providing a shop within the institution at which inmates could purchase various articles. This hospital is about $1\frac{1}{2}$ miles from the nearest shops, and at present purchases are effected therefrom or from dealers' carts which visit the institution. Both of these are conducive to the introduction of objectionable practices against the rules of the institution. In all the up-to-date hospitals in similar isolated positions in Britain the "shop" is an important feature, and the price, quantity, and quality of the goods supplied can be supervised. Such an innovation in this hospital would be a boon to many of the inmates, whom, owing to physical infirmities, are precluded from going out on leave to purchase necessities or luxuries which they may desire; for example, fruit, sweets, tobacco and cigarettes, matches, postage stamps, writing materials, aerated waters, papers and periodicals, &c. Such a shop could be profitably run by a maimed returned soldier of integrity.

THE AUSTRALIAN EPIDEMICS OF AN ACUTE POLIO-ENCEPHALO-MYELITIS (X DISEASE).

Nomenclature of the Disease.

The disease, before its nature was recognized, was in many instances notified by practitioners as "epidemic cerebro-spinal meningitis." The alarm created by crops of cases in country towns, and the absence of objective signs of meningitis on lumbar puncture, soon gave rise to the newspaper name of "The Mysterious Disease." When the disease came first under our observation and investigations were being made to ascertain its nature, we provisionally and for purposes of convenience designated it as "X disease"—a name under the circumstances non-committal and peculiarly applicable. This name, though no longer serving its original purpose, has still survived in current use, and is certainly more convenient than such a cumbersome designation as "Acute Polio-encephalo-myelitis." Its adoption as a permanent name may be advisable. If this disease is due to exactly the same virus as is ordinary acute poliomyelitis, then "X disease" can be used as a designation for a particular type of disease produced by this virus; if the virus is a mutant of that of acute poliomyelitis or if it be specifically distinct, then the term "X disease" is a convenient one for a special type of encephalitis.

The Clinical Manifestations.

Summary.—An acute and severe illness; affecting children chiefly, but not sparing adults; with an

unknown period of incubation, and often an abrupt onset; characterized by general signs of cerebro-spinal irritation—namely, convulsions, rigidity, heightened reflex excitability, mental obfuscation and loss of consciousness; accompanied by fever and by gastric and other disturbances; terminating in exhaustion, coma, sometimes respiratory paralysis, and death after a few days, or in rapid recovery, usually complete, but at times attended by flaccid paralysis of one or more limbs or by mental disorder.

The age incidence in quinquennial periods was as follows: Under 5 years, 60 cases (6 being under 1 year); 5 to 10 years, 23 cases; 10 to 15 years, 9 cases; 15 to 20 years, 3 cases; 20 to 25 years, 9 cases; 25 to 30 years, 3 cases; 30 to 35 years, 4 cases; 35 to 40 years, 4 cases; 40 to 45 years, 4 cases; 45 to 50 years, 5 cases; over 50 years, 9 cases, the oldest being 68. (In 10 cases, 6 of them adults, the age is not stated in the report.)

This analysis shows that infants and children under 5 years of age (nearly 50 per cent. of the total) were exceedingly prone to affection, and that after the age of 15 years susceptibility rapidly diminished. It is important, however, to notice that the disease was by no means confined to children, and there were no less than thirty-four cases in persons over 25 years of age, evenly distributed through the various decades up to the sixth.

Males suffered more than females, the figures being eighty-five to thirty-six.

Mortality.—Ninety-four patients died, thirty-five recovered completely, and five recovered, but with subsequent paralysis or signs of mental disorder. Age seems to have little effect on the mortality, though children under 10 years, and more particularly those under 1 year, seem to have a better chance of recovering.

This death-rate (70 per cent.) is not only high in itself, but high in comparison with that shown in other epidemics of kindred disease (acute poliomyelitis).

In the fatal cases, the duration of the illness, from the onset of the first symptom until death, was on a general average 4.6 days. In a few cases, affecting both adults and children, there was a rapid fatal ending within twenty-four hours. The case of longest duration was one lasting twelve days. In several the disease lasted nine days, but these were exceptionally long illnesses.

In the recovered cases, all acute symptoms usually passed off within from ten to twelve days, but there were milder cases in which the sickness was of shorter duration. It was often remarked that as soon as the symptoms abated in severity the progress to recovery was rapid.

Our experimental observations in this disease show that in monkeys and other animals there is a definite period of incubation (usually five to twelve days); it is almost certain, therefore, that in the human subject there is a corresponding period, but we have not sufficient data to fix its length.

Concerning prodromata, in many cases these were entirely absent, the acute illness supervening with the greatest suddenness; in a considerable number of cases, on the other hand, for from two to five days preceding the onset of acute symptoms, there was complaint of one or more of the following ailments: Headache, lassitude, general malaise, irritability and restlessness, mental confusion, drowsiness, pains in the limbs or at the back of the neck, weakness of limbs, of which headache and drowsiness were most frequent.

Onset.—The onset of acute and definite symptoms was invariably sudden. An attack of vomiting is mentioned with remarkable frequency as the initial sign, particularly in the case of children, and as frequently the eating of certain fruits got credit by patients or parents as the cause of the illness. In this connection it may be interesting to mention that in the epidemic of the year 1918, which happened to appear in the grape season, grapes fell so much under suspicion that the public in certain districts refrained almost entirely from consuming them; this suspicion even spread throughout the State of New South Wales. In point of fact the vomiting was almost certainly the initial sign of cerebral irritation. In the case of children, the vomiting was commonly followed by convulsions and fever. In adults, the opening symptoms took the form of headache, mental disorder (confusion, drowsiness, lethargy), retrocervical pains and general muscular weakness and inco-ordination. It is not surprising that some men who staggered into hospital in this confused state were primarily suspected of acute alcoholism. In the case of others heatstroke was a provisional diagnosis.

Temperature.—The illness was invariably attended by fever, which was irregular in character. In the early stages a temperature of 101 degrees or 102 degrees was usually found; and records of 104 degrees or 105 degrees, as the disease progressed, were common; later, readings of 106 degrees or 107 degrees were seen in some cases, and in one case 110 degrees was reached an hour before death; in others the temperature after high excursions fell to subnormal.

Convulsions.—The importance and frequency of convulsions, or convulsive movements of some kind, are shown by the fact that they occurred in no less than eighty-seven cases. As might be expected, children exhibited the greater liability to attack; adults, however, did not altogether escape, suffering in eight instances either from true convulsions or from spasmodic muscular twitchings while in an unconscious state. Usually the earlier convulsions were of the ordinary kind, consisting first of tonic, then of clonic contractions, and ending in a short period of unconsciousness. Occasionally a condition of *status epilepticus* had to be dealt with. When the disease was fully developed and in the later stages, as exhaustion supervened, the ordinary convulsion was replaced by erratic, perhaps alternating, movements of the arms or legs, unilateral or bilateral; and in some

instances the patient is aptly described as "thrashing the bed" with his arms or legs for long periods; again, a limb might be held flexed in tonic spasm, and in one or two children there was prolonged "head rolling." In these cases it was often noticed that a slight disturbance, such as examining or sponging the patient, or the slamming of a door, would suffice to excite a convulsive movement. The condition, therefore, was one of greatly heightened reflex excitability. In other cases without actual convulsion there were localized twitchings of individual limb-muscles, or small groups of muscles, or a coarse tremor of the limbs, significant of cerebral irritation. These might arise during consciousness or unconsciousness, or in natural sleep.

Facial movements due to irritation of cranial nerve centres were also frequently observed. These often took the form of repeated twitchings of the various facial muscles proper; grinding of the teeth was also common, and so was firm closure of the eyes. In one case there was repeated alternate protrusion and retraction of the tongue; in another, the tongue, unconsciously, and for quite a long time, was held protruded so as to touch the chin; in yet another there was continuous rapid blinking of the eyes; also, hiccup has to be mentioned. In short, there was no end to the convulsive muscular movements which appeared.

Rigidity.—Although rigidity was not noted in all cases it was one of the dominant signs. Cervical rigidity with head retraction was specially common. Actual opisthotonos was noted in several cases—in one it was so extreme that the head is described as almost touching the heels. In another case there was generalized tetanic rigidity. More often the rigidity was unevenly distributed; sometimes it affected the back, sometimes the abdominal muscles, and in some cases it affected one arm or leg, while the opposite member was unduly flaccid. In the latter cases it seems probable that if survival had occurred the flaccid limb would have been found paralysed.

Paralysis.—In the cases which ended fatally, it was difficult, on account of the acuteness and severity of the symptoms and the obscured consciousness, to form an opinion as to whether paralysis was present or not. But judging from the small number of recovered subjects who showed paralysis, it is likely that it was not frequently present among those who died. As the point is of importance, we give the following notes from the reports. Among those who died we find that in one case there was "paralysis of the arm and leg" on one side; in one case "paralysis of both arms and one leg"; in two cases "paralysis of one arm"; in one case "paralysis of both legs"; in two cases "foot and wrist drop"; and in one case "intercostal paralysis"—making a total of eight cases in which paralysis of some kind was noted (the total number of fatal cases was ninety-four). Next among those who survived—forty altogether—we find that three were left with lasting paralysis

of both legs, while in one there was "paresis of the legs which disappeared in a few days."

From this it is evident that the number of cases of paralysis, in comparison with those which have appeared in epidemics of ordinary "acute poliomyelitis," is extremely small. Accordingly we feel justified in concluding that in the epidemic under investigation paralysis was not a dominant feature.

The Reflexes only warrant the general remark that the tendon reflexes seemed to be present—sometimes exaggerated—in the earlier stages of the illness, and absent or difficult to obtain in the final stages. In two cases there was loss of speech.

Affection of Cranial Nerves.—Apart from those which subserve visceral functions and whose centres are in the medulla oblongata, there was no definite and outstanding paralysis of cranial nerves; in particular—blindness, deafness, facial and lingual paralysis, ophthalmoplegia, and even ptosis were not once observed. In one case, however, left facial paresis was noticed.

In regard to the eyes, the pupils usually reacted normally in the beginning of the illness, but towards the end often became contracted and immobile. Photophobia was occasionally noted. Nystagmus was not much in evidence. Strabismus was frequently seen, but it appeared always to be of the irritative kind and to consist of transitory conjugate or skew deviation, or other temporary loss of movement, or that irregular and dissociated slow rolling of the eyes so commonly seen in cases of meningitis.

Concerning those nerves which subserve organic or visceral functions, swallowing was interfered with in a considerable number of cases. Cheyne-Stokes breathing was occasionally noticed, in one case respiratory paralysis was found as an opening symptom, and in many cases respiratory paralysis was the assigned, immediate cause of death. Vagal paralysis was occasionally suggested, but as a rule the pulse-rate corresponded with the degree of pyrexia. When we consider the pathological changes which we have found in the medulla oblongata we are not surprised that the symptoms just mentioned were clinically in evidence.

Disturbances of Common Sensation.—Definite loss of cutaneous sensibility, if present, was not recorded in any case; likewise definite severe pain in the muscles, with accompanying fear to move or allow the limbs to be moved, like that so commonly present in acute poliomyelitis, was not a feature. Pains in the neck, however, or in the neck and spine, were often complained of in the early stages, and in some cases there were pains of a generalized, influenza-like nature. Lastly, it may be mentioned that Kernig's sign was frequently noticed.

Mental Symptoms.—Mental symptoms of some kind were present in a great number of cases. We have mentioned lethargy, confusion and drowsiness as early symptoms, and may add that these were followed with extraordinary frequency by varying degrees of unconsciousness; indeed, this happened in no less than eighty-three cases. Very commonly

the initial mental obfuscation was followed by delirium, and then by unconsciousness, gradually deepening into coma. Here we may remark that unconsciousness—apart from that attending a convulsion—did not always betoken a fatal issue; in some few of the cases which recovered there were periods of deep unconsciousness; also, in both fatal and recovered cases, lucidity sometimes intervened between periods of unconsciousness.

In adults more than in children there were symptoms suggesting insanity. In two instances the delirium was so intense as to be compared with "acute delirious mania," and notes to the effect that the patient was "dazed," "irrational or childish in speech and behaviour," "incoherent," or "insane in conduct," occur with considerable frequency. In the case of one adult, the illness was followed by mania, requiring his transfer to a mental hospital (from which he was later discharged), and in the case of one child, aged 8 years, a condition of slight imbecility followed.

Pneumonia.—Lobar or broncho-pneumonia was found, post mortem, in five cases, of which three were absolutely proved to be cases of poliomyelitis by the histological findings.

A swollen face and a swelling in front of the ear suggested the possibility of mumps in one instance.

There was abundant evidence of disorder in the alimentary tract, indicated by a coated tongue, sordes, offensive breath, and offensive, soft or liquid motions—these being in addition to vomiting, already mentioned. In some cases the condition suggested enteric fever.

Nasal Discharge.—A nasal discharge, mucopurulent and sometimes sanious, was commonly seen.

Incontinence.—Incontinence of urine and faeces appeared as a late symptom in many cases.

Priapism.—In several children there was persistent priapism.

Vaginal Discharge.—An offensive or thick yellow vaginal discharge was noted in two cases.

Albuminuria.—On account of incontinence the urine could not always be collected for examination. In eight cases, however, including adults and children, a "heavy cloud" of albumen was noticed. In several instances this disappeared as the illness progressed. In one case hæmaturia and albuminuria co-existed.

Rash.—Only three times is a rash mentioned in the notes, and in each case it was different.

The Cerebro-spinal Fluid.—Lumbar puncture was performed in a great many cases, and the obtained fluid was almost invariably reported as clear. Often, but not always, the fluid came out "under pressure."

From a series of blood-counts we find that there is usually a definite leucocytosis. Thus in sixteen cases there were 7,000 leucocytes in 1; 8,000 in 2; 18,000 to 21,000 in 7; 27,000 to 28,000 in 2; 37,000 to 39,000 in 2; and 43,000 to 44,000 in 2. In one case, which was fatal, the total leucocytes fell in two days from 37,000 to 22,000, the small lymphocytes increasing from 3 to 37 per cent.

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(continued).

It appears, therefore, that a leucocytosis, usually considerable, occurs in most cases. To this the polymorphonuclear cells, the large lymphocytes and the transitional cells usually contribute. The small lymphocytes are usually relatively decreased, though they may be actually either increased or decreased.

In some cases, suspected as enteric fever, the Widal reaction proved negative.

INFORMATION OBTAINED BY DR. DONALD WALLACE.

Dr. Wallace summarizes the result of his inquiries as follows: "The information available tends to show that this disease ('X') and acute poliomyelitis are due to the same virus, though why the brain should be more involved, with a necessarily higher mortality in the former, is difficult to understand. Is it due to a more virulent strain of organism, or are the country people more susceptible as being less immunized than city dwellers, as suggested by Swedish investigators? The points of similarity are briefly as follows:—

"(a) There are well-marked groups of cases giving a definite history of contact or opportunity for contact, with outlying isolated cases in which contact is not so clear and which are probably caused by carriers who have either not suffered from the disease or have had it in a very mild form. In this respect the Broken Hill outbreak closely resembles those of New York and Sweden.

"(b) Susceptibility is low—there was only one instance in 1918 of two members of the same family being affected—and these two were probably infected from the same source.

"(c) Like infantile paralysis, 'X' disease picks out infants and children rather than adults, and males more than females. Probably more infants and children died than the records indicate. I traced at least three deaths which were almost certainly due to 'X,' but were not reported, and several cases of abortive illness were also probably due to 'X.'

"(d) The evidence strongly points to a human carrier rather than to animals or fomites (though dirty premises and dirty habits seem to play a part). These factors, with one or two notable exceptions, were present in all this group. They act perhaps by lowering resistance, but more probably

by affording opportunities of contact—sharing fruit, food, drinking vessels, &c.

"(e) Clinically the onset and mode of termination (when death occurs) are almost identical in the two diseases, whereas the intermediate course is dominated by the part of the central nervous system chiefly involved in each, though even here there are several remarkable points of similarity, and the symptoms might be diagrammatically represented by two circles of which the circumference of each passes through the centre of the other, e.g., tenderness of the limbs, 'spine sign' of Draper, and other symptoms.

"A reference to the clinical histories will show that the systemic (infective) stage as represented by the symptoms of invasion are very similar; and as already mentioned, while in Melbourne, I learnt that death in acute poliomyelitis was always due (in their adult cases) to involvement of the medulla (respiratory paralysis) as probably always happens in 'X' disease (Dr. Burnell).

"Under this heading an additional link (which is almost conclusive) is afforded by the case of the child S., an account of whose illness is forwarded herewith (Case 25, 1918 series). In that instance the disease began as a typical case of 'X' disease, and now in convalescence (six weeks later), the child presents the appearance of a typical case of acute poliomyelitis.

"While in Melbourne, Dr. Davis of that city supplied me with particulars of a girl of about 16 years of age who had been taken ill with convulsions and protracted unconsciousness, and was at that time recovering with paralysis of all four limbs, as in the case cited above. Here, then, are two cases with very similar clinical features, but derived in the one case from an epidemic of 'X' disease, and in the other from an epidemic of ordinary acute poliomyelitis, separated widely from one another.

"(f) The pathology of both diseases is practically the same. Under this heading may be grouped:—

"(1) Cerebro-spinal fluid (alteration in cytology, &c.).

"(2) Leucocytosis.

"(3) Post-mortem findings.

"(4) Microscopic changes.

"So closely did the evidence collected by Dr. Burnell under this heading agree with the account given in Draper's book, that I really thought that he had read the book."

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REPORT OF THE COLONIAL SURGEON FOR THE YEAR 1917-18.

By CYRIL H. DURRANT, M.B.,

Colonial Surgeon.

ST. VINCENT.

The Registrar-General's returns shows that the estimated population of the colony at March 31, 1918, was 50,699.

The total number of births was 1,857: males, 948; females, 909. Stillbirths numbered 94. The birth-rate was 36.6 per thousand. The total number of deaths was 970, excluding stillbirths. The death-rate was 19.1 per thousand.

Malaria.—This disease has been less prevalent than in the preceding year, 512 cases with 6 deaths being recorded.

The District Medical Officers' reports all draw attention to the prevalence of yaws, infantile diarrhoea and syphilis, while pulmonary tuberculosis claims its steady toll of victims.

Ankylostomiasis (Hookworm Disease).—The campaign against this disease operated with funds provided by the International Health Board carried on its work from April 1, 1917, to December 8, 1917.

Ankylostomiasis Campaign.—Summary of work accomplished for the period April 1 to December 8, 1917: Number of persons censused, 5,714; microscopically examined, 6,295; positive to ankylostome, 4,118; negative to ankylostome, 2,077; treated, 4,453; cured, 4,159.

The sanitary preventive work of providing "fly-proof latrines" and closets of an approved pattern has proceeded uninterruptedly throughout the year—114 new latrines have been erected.

Yaws Prevention.—The yaws dispensaries have continued their work during the year under review. At the close of the past year (1916-17) there were 687 cases under treatment.

During the year 1917-18, 590 new cases have been attended and 463 have been discharged.

During the two years that this campaign has been carried on the following results have been obtained: Total cases treated from April 1, 1916, to March 31, 1918, 2,308; total cases discharged cured, 1,152; total cases still under treatment, 619.

The success of the scheme must, as I have previously pointed out, entirely depend on the regular attendance at the dispensaries of those afflicted with the disease, and I note that Dr. Greaves, Medical Officer, District 4, has drawn attention to the fact in his report that "the people are very irregular in their attendance at the dispensaries in his district, and make but little use of the means provided for their treatment." During the year, experiments were carried out at my suggestion at the Yaws Hospital by Dr. Morrison, Medical Officer, District I, to test the efficacy of injections of

intramaine on yaws cases, but the results have on the whole been disappointing.

The work of the Government Sanitary Department and the fortnightly inspections of the District Sanitary Police have been carried out regularly throughout the year.

CYRIL H. DURRANT, M.B.,
Colonial Surgeon.

COLONIAL HOSPITAL, ST. VINCENT.

Vital Statistics.—The population of the district comprising the town of Kingstown and adjacent village of Edinburgh is estimated at 5,000 persons.

There were 192 births and 75 deaths, giving a birth-rate of 38.4 per thousand and a death-rate of 15 per thousand. There were 21 stillbirths recorded.

Mortality.—Sickness was more prevalent in the first half of the year, and accompanied with a lower death-rate than in the latter half of the year, when there were fewer cases with more deaths, 34 deaths being recorded as against 41 in the latter half of the year.

Of notifiable diseases recorded there were 15 cases of chicken-pox, 20 cases of measles, 31 cases of yaws and 65 cases of pulmonary tubercle, with 11 deaths.

Among other diseases there were 289 cases of catarrhal fevers with 3 deaths, 901 cases of infantile diarrhoea with 20 deaths, and 123 cases of syphilis (later stages) with 3 deaths.

Ninety-one cases of malaria with one death were recorded as against 185 cases in the previous year.

The sanitary condition of the town of Kingstown has been fairly well maintained by the sanitary inspectors. The main streets of the town has been immensely improved by concreting the side-walks of the street and correcting the faulty drainage from several of the adjoining premises.

Vaccinations have been somewhat irregularly performed during the year owing to the uncertain arrival of lymph. Further, the time involved in its transit *via* Canada owing to war conditions and the impossibility of insuring its transport in cold storage has rendered it inert on arrival.

CYRIL H. DURRANT, M.B.,
Medical Officer, Kingstown District.

KINGSTOWN, ST. VINCENT.

The estimated population is about 7,100. There were 252 births and 163 deaths during the year,

RETURN OF DISEASES AND DEATHS IN 1917-18 IN THE COLONIAL HOSPITAL, KINGSTOWN.

St. Vincent.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	—	—	—
Anæmia	—	—	—
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	—	—	—
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	—	—	—
Diabetes Insipidus	—	—	—
Diphtheria	—	—	—
Dysentery	6	—	6
Enteric Fever	12	8	12
Erysipelas	—	—	—
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	50	—	52
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	3	—	3
Kala-Azar	—	—	—
Leprosy	—	—	—
(a) Nodular	—	—	—
(b) Anæsthetic	—	—	—
(c) Mixed	—	—	—
Malarial Fever—	52	3	52
(a) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(b) Remittent	—	—	—
(c) Pernicious	—	—	—
(d) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	—	—	—
Malignant	—	—	—
Old Age	22	8	22
Other Diseases	85	7	87
Pellagra	—	—	—
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	8	—	8
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	—	—	—
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(a) Primary	16	—	18
(b) Secondary	1	—	1
(c) Tertiary	57	—	66
(d) Congenital	1	—	1
Tetanus	—	—	—
Trypanosoma Fever	—	—	—
Tubercle—	5	—	5
(a) Phthisis Pulmonalis	—	—	—
(b) Tuberculosis of Glands	—	—	—
(c) Lupus	—	—	—

GENERAL DISEASES—continued.

(d) Tabes Mesenterica	—	—	—
(e) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	1	—	1
Whooping-cough	—	—	—
Yaws	2	—	2
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the—			
Cellular Tissue	53	6	57
Circulatory System	—	—	—
(a) Valvular Disease of Heart	13	7	14
(b) Other Diseases	2	—	2
Digestive System—	—	—	—
(a) Diarrhœa	—	—	—
(b) Bill Diarrhœa	—	—	—
(c) Hepatitis	—	—	—
Congestion of Liver	—	—	—
(d) Abscess of Liver	—	—	—
(e) Tropical Liver	—	—	—
(f) Jaundice, Catarrhal	—	—	—
(g) Cirrhosis of Liver	1	1	1
(h) Acute Yellow Atrophy	—	—	—
(i) Sprue	—	—	—
(j) Other Diseases	2	—	2
Ear	—	—	—
Eye	15	—	16
Generative System—	—	—	—
Male Organs	50	—	52
Female Organs	161	1	164
Lymphatic System	2	—	2
Mental Diseases	3	1	3
Nervous System	24	2	25
Nose	15	—	15
Organs of Locomotion	2	—	2
Respiratory System	25	12	25
Skin—	159	—	160
(a) Scabies	—	—	—
(b) Ringworm	—	—	—
(c) Tinea Imbricata	—	—	—
(d) Favus	—	—	—
(e) Eczema	—	—	—
(f) Other Diseases	—	—	—
Urinary System	20	5	20
Injuries, General, Local—	78	2	81
(a) Siriasis (Heatstroke)	—	—	—
(b) Sunstroke (Heat Prostration)	—	—	—
(c) Other Injuries	—	—	—
Parasites—	4	—	4
Ascaris lumbricoides	27	3	29
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duo-	—	—	—
denale	27	—	27
Filaria medinensis (Guinea-worm)	7	1	8
Tape-worm	—	—	—
Poisons—	3	—	3
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	—	—	—
Amputations, Major	—	—	—
" Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(a) Cataract	—	—	—
(b) Iridectomy	—	—	—
(c) Other Eye Operations	—	—	—

giving a birth-rate of 36 per thousand and a death-rate of 23.2. Eight stillbirths were registered and are not included in the above figures.

Six cases of chicken-pox occurred in the first quarter of the year, and during the first half 17 cases of measles and 21 cases of whooping-cough were recorded. Catarrhal fevers are more frequent in the first half, and cases of diarrhoea in children and malaria fever are increased in the second half of the year.

The increase in the number of cases of diarrhoeal diseases in children during the last quarter accounts mainly for the increased death-rate during this period, in which 66 cases were treated as compared with a total of 62 for the previous eight months.

Catarrhal fevers, malaria fever, diarrhoeal diseases of children and syphilis account for 25 per cent. of the cases treated during the year. Pulmonary tuberculosis claimed 38 victims with one death; 31 cases of yaws were recorded.

The general sanitary condition of the district has been satisfactory.

Two hundred and eight children were successfully vaccinated. The lymph on occasions has been unsatisfactory, probably no doubt, owing to the difficulty in obtaining fresh supplies regularly.

M. W. MORRISON, M.R.C.S., L.R.C.P.Lond.

Medical Officer, District 1

BARROUALLIE, ST. VINCENT.

The estimated population was 9,779, with 348 births, 154 deaths, 19 stillbirths.

Sickness was most prevalent during the last quarter of the year, the month of January being the worst. The number of cases treated for that month totalled 369 with a mortality of 21.

Diarrhoea in Children.—This condition is closely associated with intestinal parasites, and has a fairly high death-rate. Of this disease there were 203 cases with 25 deaths.

Intestinal Parasites.—It is not uncommon to find in this district infants of very tender age—1, 2 and 3 months—infested with some form of intestinal parasites. There was one case of Botch recorded.

Yaws.—109 cases with one death. These are only those cases of yaws personally treated by the Medical Officer.

Pulmonary Tuberculosis.—25 cases, 12 deaths. Almost 50 per cent. of the cases treated terminating fatally within the year.

Tetanus.—This disease is most commonly met with in the newborn, in the form of tetanus of the cord. Five deaths are recorded from this disease. One of these examined post mortem, four cases having actually been treated. Of the four, three were of the cord. The other seemed to be intestinal, and was sent to hospital, but owing to delay of the parent, died before it could be taken there. This condition then, as will be seen, has the very alarming mortality of 100 per cent. Most

of these cases seem to be due to the lack of proper utensils, and other necessities (often clothing) for the care of the newborn. A revival of the Trained Nurses' Association will be a great boon to these deserving poor.

There is a decided improvement in personal hygiene in that part of the district where the nurse-midwife is now stationed. But as a whole this could be improved. It is, however, interesting to note, that even in most out-of-the-way places efforts are made to keep houses and surroundings clean.

Advice in child rearing was given according to the circumstances. The mothers were instructed as to the kind of food to be given, the intervals of feeding, and the number of meals per day. The necessity and advantages of frequent bathing and of fresh air, as well as first aid in the event of any of the simpler ailments of childhood, concerning which the mothers were for the most part ignorant.

Undoubtedly the lives of numbers of these children have been saved by the prompt and timely use of a dose of castor oil, or instructions to have a child taken to the medical officer at once when owing to ignorance on the part of the mother delay and death might easily have been the result.

Three hundred and seventy-six mothers were lectured on various subjects, such as personal hygiene, care of infants, and sanitation.

Personal hygiene, although not yet satisfactory, shows a marked improvement in this section of the district. There is also some effort made at caring for the infant, but this is still far from satisfactory. There is still too a difficulty in getting the mothers to carry out instructions, but this is sometimes due to force of circumstances and not altogether neglect. A free, or at any rate a more liberal use of soap and water is having the effect of stopping the spread of a number of skin diseases among the little ones.

W. H. FORD,

Medical Officer, No. 2 District.

BELAIR.

The estimated population is about 11,000; births, 114; deaths, 194; stillbirths, 12.

Sickness was most prevalent in the third quarter of the year under report, the mortality was highest in the second quarter.

Amongst the notifiable diseases there were 17 cases of chicken-pox, 1 case of enteric, 1 case of leprosy, 33 cases of pulmonary tuberculosis, and 103 cases of yaws.

The general sanitary condition of the district was satisfactory.

Three hundred and twenty-seven vaccinations were successfully performed during the year. The lymph supplied was on the whole good.

W. A. GEORGE,

Medical Officer, District 3.

Colonial Medical Reports.—No. 115.—St. Vincent (*contd.*)

THE CEDARS.

There were 286 births, 14 stillbirths and 147 deaths.

Sickness was most prevalent during the second and third quarters, when diarrhoeal complaints among children were very common. Catarrhal fevers were prevalent during the early part of this year.

Intestinal parasites and diarrhoea among children, due chiefly to injudicious feeding and careless habits, are responsible for a large number of cases. A high percentage of the total mortality is due to these causes.

There were 121 new cases of yaws which, with 65 from the previous year, make a total of 186. These people are very irregular in their attendance at the dispensaries and make but little use of the means provided for their treatment.

Malaria furnished 13 cases. Most of these patients had been out of the island and become infected abroad.

Influenza was prevalent during the early part of the last quarter. This was of a mild type and caused no deaths.

One case of pellagra came under observation.

The sanitary condition of the district was satisfactory.

There were 212 successful vaccinations.

D. A. GREAVES,
Medical Officer, District 4.

CASUALTY HOSPITAL, GEORGETOWN.

The population of this district is calculated by adding the excess of live births over deaths to the estimated population for the last year. For this year the population is estimated at 4,815. There were 216 live births, 5 stillbirths and 104 deaths, exclusive of stillbirths. There was a natural increase of 114.

It is best to divide the year into two parts as below:—

Diseases	Rainy season. April—September	Dry season. October—March
Whooping cough	123	40
Dysentery	39	16
Catarrhal fevers	36	64

Catarrhal fevers, mostly of mild influenzal type, preferred the later half of the year and were most prevalent in the October-December quarter.

The greater prevalence of whooping-cough during the first half of the year, i.e., the rainy season, is attributable to the wet and close moist atmosphere, these factors probably operating in the direction of lowering the resistive power of the system to the attack of the disease.

Dysentery is always amongst us—a few cases here and there, the germs in the stools awaiting suitable conditions of carriage for their spread. The marked greater prevalence in the rainy season, 39 cases as against 16 occurring in the dry season, is

due in part to the increase of fly carriers with the advent of damp and heat; but I have no doubt also to the mechanical flushing by the rains of village sewerage into streams which supply the villagers with drinking water. Herein lies one of the weak points of our village sanitation. I have observed local recrudescences in certain villages occurring soon after the first rains of the season.

Small localized outbreaks of dysentery occurred. The case mortality was 18 per cent., and it accounted for 9.6 per cent. of all deaths.

There was one case of diphtheria, which proved fatal. It was isolated.

Diarrhoeal diseases of children caused more sickness than any other individual disease and served to swell the death roll materially. This is a complex problem. Amongst infants the chief cause is unnatural and indigestible food given through ignorant belief in many cases, sometimes under the lash of poverty with its resultant callousness and insouciance for the infants' welfare. In older children the more potent agents are intestinal parasites, chiefly ascaris, sometimes thread worms, unripe fruit, and the contamination of food with germs by flies. The solution lies mainly with the educationist in infant hygiene and the sanitarian. The doctor can only hope to administer temporary comfort, and that in many cases he cannot do with success. There were 173 cases with 18 deaths, giving a case mortality of 10.4 per cent.

Gonococcus infection is very common—urethritis, epididymitis, cystitis, stricture, &c. Children of 8 to 12 have applied for treatment. The well-known tenacity of the parasite ensures for this disease a strong settlement in a community. "Prevention is better than cure" applies here with great force. The distribution of leaflets to sufferers would disseminate the knowledge of how not to spread it.

Yaws.—At the Georgetown Dispensary 102 cases were treated during the year; 13 were discharged apparently cured; whilst 60 failed to return for treatment.

At the "Fancy" Travelling Dispensary 61 cases were treated. Of this number 11 deserted from time to time; 29 were discharged as cured.

The general sanitary condition of the district is satisfactory. The main questions in the villages are the disposal of manure, sweepings and excrement, and keeping the villages free from bush. More attention to these matters is desirable.

One hundred and eighty-two vaccinations were performed. Eight vaccinations proved unsuccessful after being repeated.

C. M. AUSTIN, M.B.

COLONIAL HOSPITAL, ST. VINCENT.

The total number of cases treated at the hospital for the year under review was 1,100, five less than in the previous year.

Of the cases admitted to the wards of the General Hospital, syphilis, in various stages of the disease,

accounted for 86 admissions. Ulcers (other than those of syphilitic frambæcial origin) for 159 admissions, and intestinal parasites (ascaris and ankylostoma) for 54 admissions. There were 52 admissions for malaria with three deaths, as against 93 admissions with one death in the previous year. Tuberculosis provided 20 cases with three deaths.

The number of cases admitted to the maternity department, which is maintained as a training school for midwives, was 114.

Four probationers completed their course of training and examination and were granted certificates to practise as midwives.

There were 2,948 patients treated at the out-patient department, which is also the dispensary for the Kingstown District. Of these 75 died, giving a death-rate of 25.4 per thousand.

CYRIL H. DURRANT, M.B.

KINGSTOWN.

Yaws Hospital.

Ninety-nine cases were treated during the year. The difficulty experienced in obtaining the necessary drugs hampered greatly the treatment of these cases.

The Colonial Surgeon obtained some tubes of "Intramine" and eleven patients were treated with this agent. The results were not as encouraging as those after salvarsan injections, but such a restricted trial of this treatment precludes any definite statement as to its efficacy and detracts from the conclusions arrived at. Perhaps, however, the following summary of the cases may be of some interest.

Case 1.—A female, aged 30, with the lower part of the nose invaded by yellow crusted granulomata. She had been taking P.I. for two and a half months and was given 2½ c.c. of intramine in each buttock on December 13. There was a marked daily improvement in the lesion up to the 24th. The yellow scab had practically dried. From this date the condition of the sore remained stationary, and a second injection was given on January 12, 1918. The sore had almost healed by January 19, when the patient was discharged at her request. This is the only case of the series that gave such an encouraging result.

Case 2.—A female, aged 15, with a large, painful, crusted granuloma on right lower leg and generalized furfuraceous patches.

She received 5 c.c. of intramine on December 13, and by the 19th only a clean healing ulcer was left. This patient had been taking P.I. also for some months previously. The injection had no effect on the furfuraceous patches and the ulcer took some months to heal up.

Case 3.—A male, aged 33, with typical generalized secondary granulomata. He was given 5 c.c. on December 13; by the 19th almost all the scabs were dried up, but from this date most of the

lesions remained stationary and a week later some fresh granulomata appeared. Patient was given a second dose of 5 c.c. on January 12. This second injection seemed to have no further influence on the progress of the lesions. Subsequently fresh ones came out.

This patient had not taken any P.I. previous to the injections and was then placed on it.

Case 4.—A male, aged 19, with crusted secondary granulomata, on face and head chiefly. An injection of 5 c.c. was given on December 13. The lesions showed marked daily improvement for a fortnight but then remained stationary and later seemed to get worse. Patient was given P.I., and was discharged on May 6, 1918.

Case 5.—A female, aged 10, with granulomata on left knee and both feet, all in healing stage. She had been taking P.I. for months. An injection of 2.5 c.c. was given on December 17. By the 24th all except the knee had healed. Subsequently progress was very slow.

Case 6.—A female, aged 10, with a granuloma on right hallux. She had been taking P.I. for eight months, and was given an injection of 2.5 c.c. on December 17. The sore improved markedly and patient was discharged on January 12, 1918.

Case 7.—A female, aged 20, with lesions on both feet, all in healing stage. Patient had been in hospital for seven months. She received an injection of 5 c.c. on December 27. The condition had improved considerably a week later. Subsequently progress was very slow.

Case 8.—A female, aged 29, with large granulomata on right forearm, both feet, right knee and right thigh, all in healing stage. On December 17 she was given an injection of 5 c.c. From the 19th improvement was continuous for about a fortnight. After that no change perceptible in the sores. A second injection was given on January 12; this failed to have any further influence on the improvement effected by the first injection. Patient is still in hospital.

Case 9.—A male, aged 14, with lesions on the scrotum and both feet. He received 2.5 c.c. on December 17. The usual improvement was shown for a fortnight and subsequently all progress ceased. Patient is still in hospital.

Case 10.—A male, aged 23, with sores on nose and chin, "tubboes" on both soles and a chronic dermatomycosis on right leg. Five c.c. were injected on December 17. On the 24th the leg had healed up and the other lesions were drying up. The yaws lesions, however, did not progress further than this stage and patient is still in hospital.

Case 11.—A male, aged 19, with large generalized superficial ulcerations; 5 c.c. were injected, with a result similar to that of Case 10. A short period of marked improvement was not maintained.

Immediate Effects of the Injections.—All were given intramuscularly in the buttocks. In all cases the temperature rose within thirty-six hours to 102° to 103° F., and returned to normal about the fourth day after the injection. Subsequent

pain and stiffness were comparatively mild. All the patients were walking about by the fourth day and most could sit with little discomfort. No untoward effects were experienced.

Conclusions.—The first injections undoubtedly produce a marked and continuous improvement in the sores for a fortnight. Subsequently there is a tendency to relapse in the absence of treatment with P.I. A second injection seems to have no reinforcing effect on the initial improvement and

carries it no further. In two cases it failed to prevent the appearance of fresh eruption.

The best results were obtained in those cases who had been taking P.I. for some time previously, and the stay in hospital of some of these who received injections was unquestionably shortened. A more extensive experience with this agent might lead to different conclusions.

M. W. MORRISON,
Medical Officer, District 1.

ANNUAL REPORT FOR 1917.

Colonial Medical Reports.—No. 116.—Egypt.

GENERAL HOSPITALS.

Statistics.

THE present number of hospitals is registered as twenty-three; this is not really an increase of one hospital, for the hospital at Mersa Matrûh, having been taken over by the Frontier Districts Administration, ceases to be shown in the 1917 list, while the Port Said and Tanta infectious hospitals have been counted as separate hospitals.

The number of beds continues to maintain the marked rise that was shown in 1915, and the number of in-patients this year showed a slight rise, as might be expected, to correspond with the increased number of beds.

The cost of upkeep of the hospitals for 1917 was L.E. 114,591·683 milliemmes, a decrease on the previous year of L.E. 8,788·177 milliemmes.

This economy resulted from the orders all units received to take every care in avoiding extravagance, and is very satisfactory considering the present high prices of all drugs, dressings, food, &c.

In 1917 an electric light plant was installed at Benha hospital, with provision for a complete X-ray apparatus, which, unfortunately, has not yet arrived. The means for accomplishing this was provided by local subscription, and it is an example which it is hoped other Mudiya towns will follow, and thus the inhabitants will interest themselves in an institution which, though a Government one, concerns their town life so very intimately.

During 1917 all the children's dispensaries have been open, and a new one at Damanhûr was started in June, which makes thirteen in all now working.

The dispensaries suffered a great loss in the death of Miss Owen at Mansûra. Miss Owen had been in charge of the dispensary since its commencement in 1912.

The total number of attendances at the dispensaries during the whole year was 390,810 in 1916; of these, 70,223 were new, being an increase of 135,728 and 21,300, respectively.

The working days of the dispensaries for the year averaged 293.

At Asyût, work was suspended for ten days

owing to the high Nile flooding the house; and at Port Said the dispensary building was requisitioned at fourteen hours' notice by the Military Authority in order to accommodate a boys' school, so work was also stopped there until a temporary house could be found in which to carry on the work.

The gratuitous services of the medical men who have helped during the year in visiting the dispensaries are much appreciated; it is difficult to persuade all the cases that need a medical opinion to go to the hospital, as the mothers are afraid of being sent to cordon.

In those towns where the ophthalmic hospital is situated at some distance from the dispensary, the Director, Ophthalmic Hospitals, has arranged for a cart to attend daily, so that children suffering from some other ailment as well as their eyes can be treated at both institutions, and the arrangement is now working satisfactorily at Asyût and Mansûra.

The opening of the ophthalmic hospital at Faiyûm reduced the numbers attending the dispensary considerably, so one matron was found sufficient for the work. The second matron is now in charge of the *dayas'* school, which was opened in June, an adjoining house having been taken to accommodate the two institutions.

The high price of bread is influencing the nutrition of the children in most places, both among the town as well as the country cases, and affects the nurslings as well as the older children.

The difficulty of obtaining suitable matrons for the *dayas'* schools has hampered the work this year, one school having closed in May owing to the matron's resignation on account of marriage, and another in November on account of the matron's ill-health. Efforts are now being made to find candidates in England. One new school was established in Faiyûm in June, making seven in all now working, and has already gained the confidence of the people. Another in Damanhûr is ready to open in the new building, which is being specially adapted for the dispensary and school. The others, which have been working throughout the year, are doing well.

An improvement in the method of selecting candidates has resulted in a better type of pupil entering, and those pupils who have not already taken out their hospital certificates are now examined in the extra subjects at the school examination, but the lack of any authority with powers to deal with the town *dayas* adds greatly to the difficulty of the matrons' work, and can only be overcome with the passing of a Midwives' Act, as many of these women openly defy the instructions of the Health Office.

The total number of cases attended during the year was 2,373, the proportion of abnormal to normal deliveries being about 9.5 per cent. (186 out of 1,956), while the total number of cases in 1916 was 2,197, and the proportion of abnormal to normal deliveries being about 9.4 per cent. (176 out of 1,870).

The analysis of abnormal cases shows practically the same class of complication as obtains in Europe, though perhaps transverse presentations are somewhat more frequent.

The total number of visits to patients in their own homes by the matron and pupil *dayas* was 29,615 in 1917, compared with 28,119 in 1916.

The number of premature and stillbirths is marked. Maternity mortality among the cases attended stands at one in 314 in 1916 and at one in 158 in 1917, most being cases in which there was long delay before the help of the school was sought.

The number of women seeking advice for gynaecological troubles is very large, but most are sent away, as such work is outside the province of the maternity schools, but the matrons help as many as they are able to.

There is a notable absence of ophthalmia neonatorum among the cases, and practically no tetanus during the time of the *dayas*' visits, though it is probable that cases reported to have died later through inability to suck may have been due to this cause.

The number of in-patients during the year was forty-six in 1917, compared with thirty-one in 1916.

One hundred and thirty pupils have been trained and taken their certificates, and six have failed to pass the examination in 1916, and 147 pupils have taken their certificates and six have failed to pass the examination in 1917.

The assistance given by the doctors of the Government hospitals and also by private practitioners in attending abnormal cases is invaluable, as are also the lectures which are given at some of the schools by the hospital medical officers.

It was hoped that two nurses would be appointed, attached to the Public Health Department, who would be employed in inspecting the *dayas* after leaving the schools, and who would also be available to do emergency *locums* in case of sickness of any of the matrons, as it is extremely difficult to get suitable *locums* at short notice, and it is important that the establishments should not be

closed. Some inspections have been carried out in the villages, and the result of these visits only confirms the need for more inspection of the past pupils.

INFECTIOUS DISEASES.

The chief features to be remarked in connection with infectious diseases in 1917 are:—

(i) A considerable increase in the case incidence of relapsing fever as compared with the normal.

(ii) An increase in the case incidence of typhus fever as compared with the normal.

(iii) A decrease in the case incidence of plague as compared with 1916.

The number of relapsing fever cases which occurred in 1917 is the largest so far recorded in this country.

The number of relapsing fever cases and deaths reported in 1917 was 11,162, with 1,043 deaths.

Although the number of typhus fever cases recorded during 1917 is much above the average, the total is some 12,000 less than that reached in the previous year.

The number of typhus cases and deaths reported during 1917 was 18,569 with 4,174 deaths.

The continuous drop in the death-rate, as stated in the report of last year, is probably due to better reporting of the disease.

An attempt was made in dealing with this disease in the villages to test the relative values of measures (a) based on the theory that the disease is conveyed by the louse, and (b) on the theory that the disease is produced by inhalation of infected material.

The measures adopted, based on the louse-infection theory, were:—

(i) Immediate isolation of the cases.

(ii) Steam disinfection of clothes worn by contacts. Bathing of bodies of contacts where possible.

(iii) Steam disinfection of everything in the houses of patients or contacts likely to harbour lice.

(iv) Daily observation of the people living in the house of the case.

(v) General disinfection of the clothes of the villagers, without reference to contact, where the disease was widespread.

The measures employed under (b), inhalation theory, were:—

(a) Isolation of the cases.

(b) Complete and careful daily observation of all contacts.

(c) No disinfection whatever of contacts or houses.

These two sets of measures were applied so as to exclude variation of result caused by extraneous circumstances, such as the variation in climate, habits of the people, &c.

Measures based on the theory of louse infection gave considerably better results. They have since been applied to all *mudiriya*s.

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A considerable extension of steam disinfection has been effected by the use of portable galvanized iron drums, made on the principle of an autoclave. On several occasions, in severely infected villages, general disinfection of the clothes of villagers has been accomplished with the necessary rapidity by connecting up the engines of steam flour mills with wooden barrels, in which the clothing was placed.

The total number of declared cases of plague in 1917 was 732, as compared with 1,702 in 1916. The number of deaths was 399, showing a mortality of 54·5 per cent., compared with 828 in 1916, or 48·7 per cent. in 1916.

Outbreak at Suez.—Of these 732 cases, 318 occurred in Suez.

The last outbreak of plague in Suez occurred in 1907. Since that year Suez remained free from plague. The first case in 1917 in the town was detected on May 5, and the outbreak lasted till July. In April, twenty-one cases had occurred amongst troops and Egyptian labourers camping further north of the Canal.

There was a severe epidemic among the rats.

The outbreak was of a virulent nature. Three hundred and eighteen cases occurred, and 58·1 per cent. died. The majority were bubonic in type, but fifty-one septicæmic cases were notified, and eighteen cases of secondary pneumonic infection. Among the contacts of the latter, only two cases of primary pneumonic plague occurred.

Since the commencement of the war Suez has been overcrowded in its poorer quarters by casual labourers imported from all parts of the country for the additional work produced by war conditions. This overcrowding materially increased the number of cases.

Out of a total of 732 cases which occurred in 1917, 608 were of the bubonic type, sixty-five of the septicæmic, and fifty-nine of the pneumonic.

The movement of troops and native levies caused by the war has involved the introduction into all parts of Egypt of a considerable mass of malaria infection.

It was decided in the early part of the summer that energetic steps must therefore be taken to prevent the spread of the disease.

A committee composed of members of all Government administrations interested in the question was therefore formed.

An Army representative was also appointed.

A sum of money was granted for drainage experiments urgently required in Cairo district, and those were undertaken.

Cholera Cases.—On June 27, 1917, the s.s. *Maryland* arrived at Port Said from Aden. This ship had Indian coolies on board with cholera, who were disembarked at Aden. Eight of her passengers disembarked at Port Said, and they were immediately put under isolation in the fever hospital. Specimens from their stools were

examined bacteriologically, and one of them was found to be excreting vibrios suspicious of cholera.

Sinai.—In December, 1917, two cholera cases occurred in Sinai, one in a native woman in Belah village, and the other at El Arish, in the person of a Camel Transport Corps labourer who had been evacuated from Ramleh district.

Cases in the Interior.—In December, 1917, three cholera cases occurred amongst labourers returning from military employment:—

(i) An Egyptian Labour Corps labourer who had been discharged from Kantara on December 17, 1917, after debility following on fever of unknown origin. He died in his village, Tell Beni Tamim, Shibi el Qanâtir Markaz, two days after his return.

(ii) An E.L.C. labourer who arrived from Kantara to Imbâba on December 12, 1917. He was put under observation under the control system, and died on December 25, 1917. He had been working in Palestine before his return to Kantara.

(iii) An A.S.C. *sais* who had been working for three months in Kantara. He arrived at Cairo on December 29, 1917, and was found in a street in Sayeda Zenab quarter, and was consequently removed to the Abbassia fever hospital.

In addition to the three above cases, two other cases occurred amongst Turkish prisoners of war recently brought into Egypt. The first was detected on November 27, 1917, and the second on November 30, 1917.

The system of notification and observation of labourers discharged from service with the Army east of the Canal, alluded to in last year's report, was continued and developed. By this agency cases Nos. (i) and (ii), described above, were detected and the necessary measures taken in time.

In view of the constant menace of cholera infection to which the country was exposed during the year under review, it was thought necessary to obtain additional legal powers of dealing with the disease. A new law (No. 10, dated June 26, 1917) was therefore passed. The powers granted under this law give much more summary powers than previously existed of protecting water supplies, dealing with defects in mosques, public kitchens, cafés, aerated water factories, &c.

The number of cases recorded of small-pox is the lowest during the last nine years. The death-rate is the same as in 1916.

Owing to the war and to the difficulty of providing ships for pilgrims, the Ministry of Interior issued a Circular, in which it was laid down that the Government had only provided ships for 1,000 pilgrims, and that applications would be accepted according to the order in which they were submitted.

Two hundred and eighty-one pilgrims left for the Hedjaz, in addition to the Mahmal escort, which amounted to 582 persons.

They embarked at Suez for Jedda on September 12, 1917, on board the s.s. *Neguleh*.

The Mahmal and its escort were embarked on one of His Majesty's cruisers.

All pilgrims were vaccinated against cholera by the medical officer of the Mahmal.

No visit was made to Medina, owing to the fact that it was still in Turkish hands.

The health of all pilgrims was good. On arrival at Suez, only four were found sick and admitted to Suez hospital. The result of the further observation was satisfactory, as all pilgrims except one were traced and observed.

In 1917 the Department gave its opinion regarding the holding of thirty-seven *mileds*, the period of celebration of which varied from three to fifteen days each. No other *mileds* were celebrated.

Six hundred and seventy barbers were given sanitary permits during the year.

Three thousand three hundred and fifty-eight passengers arrived at Suez from other ports. Also 76,632 E.L.C. men returned from Mesopotamia. The latter were put under observation for five days in a special camp at Suez, and any of them found with a history of malaria were subsequently examined and treated for this disease by the medical officers of their places of destination.

Towards the end of 1916 the gradual institution by the Army of separate military laboratories, in connection with the various Army hospitals in the Cairo area, greatly relieved the excessive pressure of work on the Bacteriological Section of the Public Health Laboratories, which, until the Army could make the necessary arrangements, had temporarily undertaken the whole bacteriological diagnosis work of this area. During 1917 this decentralization was completed, and the laboratories attached to the various military hospitals were able to deal with practically the whole of their routine bacteriological diagnosis, special cases only being referred to the Public Health Laboratories.

The chemical work undertaken for the Army, on the other hand, showed a considerable increase. This consisted mainly in chemical analyses of drinking water, foodstuffs, disinfectants, &c.

It will be seen that there is a steady increase in the amount of work done by the laboratories, and everything appears to point to this rate of increase being continued.

In view of the importance of the knowledge of malaria and of relapsing fever, the diagnosis of these two diseases is now undertaken by the laboratories for private practitioners free of charge.

The question of food and diets, especially in connection with pellagra, received a considerable amount of attention, and suitable dietaries were drawn out for the different classes of refugees at the Armenian Refugee Camp, Port Said. These dietaries were put in force early in the year, from which time pellagra appears to have gradually disappeared from the camp.

The question of the preparation of flour in this country and its adulteration was studied, and some of the different types of flour-mills visited. Also

some biological tests were attempted in connection with the differentiation of the different flours.

The laboratories have arranged to take over from the Government Analytical Laboratory the standardization of opium for the Customs Administration, and also the examination of *hashish* for the Customs and Coast Guards Administrations.

Owing to the war conditions great difficulties have been encountered in obtaining scientific apparatus, glass, chemicals, &c., from Europe, but an adequate supply has so far been obtained, and the work of the laboratories has not suffered.

Owing to the steady increase in the work of the laboratories, the present arrangements for the receipt and registration of the large number of specimens sent for analysis from Cairo and the provinces, together with the correspondence relating to these specimens, have become inadequate to deal with the work, as much of this is naturally of an urgent nature and necessitates a considerable amount of telephonic communication in addition to the ordinary correspondence. With a view to remedying this, the Central Administration kindly lent the services of the Deputy Director of the Administrative Service, who was asked to report on the most suitable method of dealing with this section of the work. As a result, a satisfactory scheme has been evolved for the reorganization of the clerical work connected with the receipt and registration of specimens and the reporting of results.

Owing to the scarcity of paper, some papers and reports written by the members of the staff were held up for publication. These are in the hands of the Government Printing Press, and will be published as soon as the facilities will allow.

The occurrence of an outbreak of cholera in the area under military occupation east of the Suez Canal, necessitating the institution of stringent measures on the part of the Department for the protection of Egypt, involved a considerable amount of increase in the cholera work.

In view of the importance of the immediate detection of any cases occurring in Egypt, arrangements were made for the reception and examination of specimens arriving at night. Specimens were sent to the laboratories in special ice boxes, a large number of which were kept at numerous centres throughout the country.

In addition to the routine diagnosis, a number of disinfection and other experiments were carried out in connection with cholera prophylaxis, and advice and assistance given to the Epidemic Section in the drawing up of cholera regulations and on many questions of cholera prophylaxis.

The number of examinations made for Government hospitals and Government services throughout the country shows an increase on last year's figures, the increase being mainly under the headings of cholera, malaria, and relapsing fever.

The examination made for private practitioners shows an increase of 224, the increase being mainly

under the heading of diphtheria. Owing to the extension of the free list for private examinations, the amount of fees collected was small.

During the spring, advantage was taken of the large number of typhus cases in the Government Infectious Diseases Hospital, and an investigation was begun in connection with this disease. Passage experiments were carried out on guinea-pigs, and these at the end of the year had reached the twenty-fourth passage. In all, some 160 guinea-pigs have been utilized. This has given opportunities from time to time, as the routine work allowed, of investigations into the nature of the causal organisms by microscopical and cultural methods. Experiments were also carried out in relation to the part played by infected lice in the transmission of the disease. These experiments are being continued.

Opportunity was taken for the preparation of a polyvalent agglutinating paratyphoid A serum, one of the members of the staff having isolated and worked through some 200 different strains. Exhaustion experiments were carried out with a view, if possible, to find some form of classification in these and allied organisms.

Various agglutinating sera were made in connection with different organisms isolated, especially for many of the vibrios separated from suspected cases of cholera.

The laboratories were regularly consulted by the different Government Departments for advice and reports on various specimens, such as disinfectants, filters, milk, &c.

Some difficulty was experienced in obtaining and maintaining an adequate stock of experimental animals, but arrangements have now been made for the breeding of rabbits and guinea-pigs, so that it is hoped this difficulty will be suitably met in the future.

A regular weekly examination has been made throughout the year of the water, and a daily bacteriological examination of the supply as delivered in the town.

Bacteriological examinations of the ice supply in Cairo and of samples of aerated waters collected in Cairo have been regularly carried out for the Cairo Health Inspectorate.

The analyses of water supplies for the British Army have been continued during 1917 and a complete list compiled, showing the results of some

hundreds of analyses of well waters in Egypt and Sinai, together with all available information as to the nature and site of each well.

The amount of vaccine lymph issued in 1917 was greater than in any of the six preceding years.

The high figure of 1917 was due chiefly to two reasons:—

(1) The decision of the Department to replace arm-to-arm vaccination by calf lymph vaccination throughout Egypt.

(2) The vaccination of all Egyptian labourers recruited for the British Army.

As vaccination is compulsory under the Egyptian laws and regulations, it is very desirable that every facility should be given to medical men in the way of obtaining an adequate supply of reliable vaccine. The Department is therefore arranging that in future vaccine will be supplied gratis to all registered medical practitioners in Egypt. It has up till now been the practice of pharmacists to keep a stock of vaccine for sale to medical men or to the public. This practice is most undesirable, as the pharmacist usually had no means of keeping the lymph at a suitable temperature, and purchasers of the lymph had no guarantee that the lymph was active. It has therefore been decided that in future no lymph will be issued except to medical men.

In Cairo arrangements have been made by the Medical Officer of Health that supplies of lymph will be kept in each qism, where they can be obtained by any medical man gratis on written demand.

In this way a free supply of reliable lymph will always be immediately available.

It is interesting to note that, whilst the activity for children dropped to a very low point, the lymph remained highly active for the buffalo calves, giving good typical pustules with many secondary pustules.

Fresh seed vaccine, both glycerinated and lanolinated, obtained from England gave very poor results.

Passage through rabbits, by Calmette's method, was also unsatisfactory.

A good strain was finally obtained by retro-vaccinations, lymph from typical pustules in healthy children being chosen for the inoculation of the calves.

Colonial Medical Reports.—No. 117.—British Guiana.
REPORT OF THE SURGEON GENERAL FOR
THE YEAR 1918.

By J. H. CONYERS,

Acting Surgeon General.

SURGEON GENERAL'S OFFICE,
 Georgetown, Demerara,
 September 3, 1919.

GENERAL HEALTH.

THE year 1918 has been an unhealthy one, more particularly during the last quarter, when a widespread epidemic of influenza of severe type caused, it is estimated, 2,326 deaths, and had not at the end of the year reached its maximum intensity. In the single month of December, it is estimated, it raised the general mortality for the year by 7 per 1,000. A milder type of the epidemic occurred in the months of July and August, and particularly affected the Diamond Estate and Plantation Wales.

The deaths from malaria have again increased from 1,436 in 1917 to 1,680 in 1918.

The population at December 31, 1917, was estimated to be 313,999 and at December 31, 1918, was 310,972, or a decrease of 3,027.

There were 12,614 deaths and 7,791 births, or an excess of 4,823 deaths over births. Immigration exceeded emigration by 1,796, and to this extent modified the decrease.

The birth-rate, 25.1, was the lowest since 1894, and the death-rate 40.6, the highest since the Registration Ordinance of 1868.

The infant mortality was 223 per 1,000 births, as compared with an average of 204 for the last ten years.

URBAN DISTRICTS.

In common with the rest of the Colony, influenza seriously affected the vital statistics of the city for 1918. In December the total deaths registered were 422 against a monthly average of 165 for the preceding eleven months. The epidemic was still severe at the end of the year.

VILLAGE AREAS.

The primitive sanitation in most of the villages is a matter for much concern.

The water supply for the most part is of the poorest quality and often very deficient in quantity, so that in times of drought there is great scarcity of even drinking water, and the little obtainable has to be brought from long distances. Artesian wells have been drilled in some of the villages, but though abundant water of good quality has been obtained, in nearly every instance in a few months the flow has altogether ceased or been greatly reduced, chiefly from blockage with sand. When

the difficulties in connection with these wells have been overcome, a marked improvement in general health may be expected.

For the most part the drainage of these areas is deplorable, and in the rains many are under water.

In certain areas there is taking place gradual but slow improvement in general sanitary conditions.

The prevailing diseases are first and foremost malaria, bowel complaints, Bright's disease, ankylostomiasis, and in December most of the villages suffered severely from influenza.

The following extracts are taken from the reports of the medical officers:—

Dr. McKinnon refers to the faulty kokers at Nos. 78 and 79, allowing the village trenches to be flooded with salt water at high tides.

Dr. Gewand in the Cotton Tree district states: "One of the crying needs of the district is water supply."

Dr. Ferguson in the Peter's Hill district states in reference to the influenza epidemic: "The mortality in the villages, however, has apparently been lower than on the estates."

Dr. Teixeira of the Anna Regina district writes: "The influenza epidemic exacted a tremendous toll in all the villages. The sanitary condition of the villages appears to be improving. Latrines are being erected everywhere."

Dr. Craigen in the Suddie district reports: "Malaria was very prevalent during the months of April, May, June and July, the number of cases at Aurora being very large. Practically every resident here has an enormous spleen."

Dr. de Freitas in the Mahaicony district reports: "The water supply is very unsatisfactory in quality and deficient in quantity. During a dry season the great majority of the villagers obtain water from the creeks and trenches, the amount being barely sufficient for cooking and drinking purposes, and very little being available for bathing purposes."

Dr. Ozzard in the Buxton district writes: "Severe epidemics of (a) malarial fever and (b) influenza, (a) at the beginning and (b) at end of year."

Dr. Boase in the Belle Vue district refers to the very large still-birth rate during the year.

Dr. Earle in the Philadelphia-Leguan district writes: "The wreckage of sanitation consequent on the abandonment of the sugar estates and the lapse of the controlling power of the Government medical officer is as clearly evidenced in Leguan as elsewhere."

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Writing of the influenza epidemic, he points out the disadvantages of the villages as compared with the estates in the lack of accommodation and nursing facilities, and pays a tribute to the work of the local dispensers, the Baby-Saving League nurse, and a special nurse from Georgetown, in dealing with the numerous cases in the villages during the epidemic.

SUGAR ESTATES.

There was a marked diminution in the number of births on the sugar estates, 1,399 as compared with 1,759 in 1917.

The deaths, including all persons dying on the estates and those from estates dying in the public hospitals, were 2,479 in 1918, compared with 1,724 in 1917.

The prevailing diseases were much the same as in the villages, and all the estates suffered from the influenza epidemic in December, though in most the maximum intensity was not reached until January.

At Skeldon, Dr. McKinnon reports that 95 per cent. of the district was affected by this disease, and at Plantation Skeldon two qualified dispensers with a gang of assistants were engaged in visiting the yards and ranges, seeking out the sick, distributing medicines and disinfecting rooms, while two ranges were used for convalescents and mild cases, in order to relieve the congestion at the hospital. Similar reports come from nearly all the plantations.

Dr. Kennard points out that births and deaths at Albion and Port Mourant were about the average. Influenza on these properties was marked later than elsewhere.

At Blairmont, Dr. Gewand reports: "A total rearrangement of the latrine system," and the progress of a special campaign against ankylostomiasis.

At Cane Grove, Dr. Wills comments on the complications of influenza, diarrhoea in a large proportion of cases, pneumonia in a small proportion.

Dr. Ferguson reports epidemic influenza in July and August, and in December of a more severe type.

Dr. Boase reports influenza confined to Plantation Wales in July. In December it was epidemic all over the district and of a more severe type.

Dr. Earle in the Philadelphia-Leguan district draws attention to the increase in the number of enlarged spleens at Uitvlugt in the years 1916, 1917 and 1918, and attributes it to irregular distribution of quinine in the two former years, and its non-administration in the latter.

Dr. Teixeira writes of Anna Regina: "On this estate there has been considerable sanitary improvement for which the manager is entitled to much credit."

Of Hampton Court he writes: "During December the whole estate was under water."

There has been a reduction of 12 per cent. in the notifications from enteric fever.

During the year 10,372 doses of typhoid and paratyphoid vaccine were supplied by the Bacteriological Department to different parts of the colony.

TUBERCULOSIS.

An examination of the figures for the whole Colony shows a very remarkable reduction in the mortality rate from 23.4 in 1911 to 17.4 in 1918.

The society for the prevention and treatment of this disease has established new branches in New Amsterdam and Mahaica during the year. There are now four dispensaries.

MALARIA.

This year there has been a considerable increase in the number of deaths from malaria.

The rate in the last four years has again begun to rise until in 1918 it is 54 and again back to the figure of 1911. These figures suggest that there are cycles of malaria probably dependent on the rainfall, and the opportunity or otherwise for the breeding of anopheles. They are also a commentary on the failure of the prophylactic measures employed.

Over and over again the profession has pointed out not only the large yearly toll of deaths malaria exacts, but the large amount of disabling sickness it is directly responsible for, considerably impairing the value of the labourer and leaving him an easy victim to other diseases. Not uncommonly stillbirths, premature births, and the births of weakly infants are due to the same active cause, and further adversely affect the vital statistics.

There can be no improvement unless anti-malarial measures, well recognized and successful in other countries, be carried out here with the hearty co-operation of all concerned.

The Surgeon-General in his report for 1917 writes: "A special malarial gang is absolutely necessary constantly at work under the control of one who has had special experience and training in this work in this Colony. If these gangs are supplied it would be easy to reduce the malaria deaths and sickness in any community, estates as well as villages, by a third, and probably in a few years by two-thirds or three-quarters. This is the proper and only cheap method of preventing this terrible disease."

Of quinine Dr. Wise writes: "Quinine has a distinct value in preventing malaria, but it must never be considered that the prophylactic use of quinine renders other measures unnecessary. Quinine can never take the place of permanent and thorough drainage with careful and constant attention to unavoidable water collections. Quinine prophylaxis does not entirely prevent malaria even when most thoroughly carried out, and it is moreover the most expensive way of obtaining a reduction of malarial fever."

To emphasize the point it may be added that

RETURN OF DISEASES AND DEATHS IN 1918 IN THE PUBLIC HOSPITALS OF

British Guiana.

GENERAL DISEASES.

	Admis- sions	Deaths	Total Cases Treated
Alcoholism	31	1	31
Anæmia	54	3	54
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	7	1	7
Chicken-pox	47	1	47
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	377	112	377
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	9	—	9
Diabetes Insipidus	1	—	1
Diphtheria	6	2	6
Dysentery	450	108	450
Enteric Fever	326	80	326
Erysipelas	1	—	1
Febricula	3	—	3
Filariasis	—	—	—
Gonorrhœa	208	—	208
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	952	163	952
Kala-Azar	—	—	—
Leprosy	—	—	—
(a) Nodular	1	—	1
(b) Anæsthetic	43	1	43
(c) Mixed	—	—	—
Malarial Fever—	—	—	—
(a) Intermittent	1,248	37	1,248
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(b) Remittent	—	—	—
(c) Pernicious	21	21	21
(d) Malarial Cachexia	19	3	19
Malta Fever	—	—	—
Measles	1	—	1
Mumps	2	—	2
New Growths—	—	—	—
Non-malignant	50	1	50
Malignant	93	20	93
Old Age	22	—	22
Other Diseases	61	23	61
Pellagra	10	5	10
Plague	—	—	—
Pyæmia	1	—	1
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	190	—	190
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	40	33	40
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	56	2	56
(a) Primary	16	—	16
(b) Secondary	31	—	31
(c) Tertiary	83	7	83
(d) Congenital	31	12	31
Tetanus	16	11	16
Trypanosoma Fever	—	—	—
Tubercle—	—	—	—
(a) Phthisis Pulmonalis	—	—	—
(b) Tuberculosis of Glands	—	—	—
(c) Lupus	—	—	—

GENERAL DISEASES—continued.

(d) Tabes Mesenterica	—	—	—
(e) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	8	—	—
Varicella	—	—	—
Whooping-cough	29	5	29
Yaws	60	—	60
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the—			
Cellular Tissue	878	37	878
Circulatory System	240	73	240
(a) Valvular Disease of Heart	—	—	—
(b) Other Diseases	—	—	—
Digestive System—	1,520	298	1,520
(a) Diarrhœa	—	—	—
(b) Hill Diarrhœa	—	—	—
(c) Hepatitis	—	—	—
Congestion of Liver	—	—	—
(d) Abscess of Liver	—	—	—
(e) Tropical Liver	—	—	—
(f) Jaundice, Catarrhal	—	—	—
(g) Cirrhosis of Liver	—	—	—
(h) Acute Yellow Atrophy	—	—	—
(i) Sprue	—	—	—
(j) Other Diseases	—	—	—
Ear	29	—	29
Eye	418	—	418
Generative System—	—	—	—
Male Organs	475	9	475
Female Organs	1,934	78	1,934
Lymphatic System	105	1	105
Mental Diseases	117	—	117
Nervous System	294	52	294
Nose	34	—	34
Organs of Locomotion	220	3	220
Respiratory System	1,560	453	1,560
Skin—	764	12	764
(a) Scabies	—	—	—
(b) Ringworm	—	—	—
(c) Tinea Imbricata	—	—	—
(d) Favus	—	—	—
(e) Eczema	—	—	—
(f) Other Diseases	—	—	—
Urinary System	1,098	306	1,098
Injuries, General, Local—	767	14	767
(a) Siriasis (Heatstroke)	—	—	—
(b) Sunstroke (Heat Prostration)	—	—	—
(c) Other Injuries	—	—	—
Parasites—	622	58	622
Ascaris lumbricoides	—	—	—
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duo- denale	—	—	—
Filaria medinensis (Guinea-worm)	—	—	—
Tape-worm	—	—	—
Poisons—	15	3	15
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	4,385	44	4,385
Amputations, Major	—	—	—
" Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(a) Cataract	—	—	—
(b) Iridectomy	—	—	—
(c) Other Eye Operations	—	—	—

over and over again quinine fails to prevent malaria; not only in this country, but from all over the world the same reports come to hand.

On the sugar estates, where more care is taken in the drainage of the "yards," and quinine is given more regularly, the malaria rate is much lower than in the adjacent villages. More attention is, however, necessary to the settlements on the "pasture" lands of estates.

ANKYLOSTOMIASIS.

On some of the sugar estates the treatment introduced by Dr. Ferguson has resulted in a diminution of the infection of all residents to about 20 per cent.

In other estates treatment is limited to new arrivals from India, who show a high degree of infection, and to all patients in hospital found to harbour the parasite.

Dr. Craigen fears "the habits of the people will not allow the improvement to be permanent, and in a few years the condition will be as bad as ever."

It is clear that it is only by repeated effort, *year after year*, such as Dr. Ferguson carries out, that the disease will be gradually brought under control.

INFLUENZA.

Two special reports have been submitted on the influenza epidemic. The following is a recapitulation of the main facts:—

In July and August a mild but widespread form of the epidemic affected Plantation Diamond and Wales. There were few deaths. Late in November there started a severe type of the disease at scattered parts of the Colony, which rapidly became epidemic over the whole coastlands and penetrated to the furthest settlements up the rivers. In the far interior the Indians were not affected, though on the lower reaches of the rivers they suffered extensively and severely. All races were affected.

East Indians suffered far more severely than the blacks, their death-rate being more than double. In the epidemic of 1890-92 the other races suffered equally with the East Indian. In the former epidemic, as in this, the aboriginals also were seriously affected, their mortality rate being even higher than that of the East Indian. Europeans were only slightly affected, and the Portuguese and Chinese rate was somewhat less than the black.

Males were affected much more than females, making an allowance for the greater number of males in the population (roughly sixteen males to fifteen females). All ages were affected, but particularly the age period, 30-40. The period 20-30 suffered nearly as severely. Infants under 1 were not affected.

The Colony has suffered the most formidable visitation of disease within living memory. It is estimated that out of a total mortality of 8,887 in the months of December, January and February,

influenza was responsible for 6,378 deaths. The maximum intensity was in January.

INFANT MORTALITY.

The infant mortality for the Colony was a considerable increase on last year's figures. The training of midwives continues steadily. Twenty-six qualified in 1918.

Since July, 1908, an outdoor maternity department has been maintained at the Public Hospital, Georgetown. The Baby Saving League now employs twenty-four midwives.

A creche in Georgetown has now completed its fourth year of existence under the supervision of the League. It also employs a health visitor in Georgetown, and in the country districts its midwives do a great deal of health work.

In the influenza epidemic in December the League's midwives were placed at the disposal of the district medical officers to assist in the nursing of the sick poor, who would otherwise have had no skilled attention. There were eighteen centres where infant clinics were held during the year.

PUBLIC HEALTH.

There are five Government sanitary inspectors working under a chief sanitary inspector. In addition there are nine others maintained by the villagers themselves. These supervise the interlot drainage, the weeding of undergrowth, the grading of lots, the erection, repairing, whitewashing and banking of latrines, screening of vats and barrels, and generally the work of keeping the surroundings of dwellings clean and free from unnecessary collections of water. Work is slow and disheartening from the lack of co-operation by the villagers and often by the village councils. The pig nuisance is a serious one, as they destroy drains, streets and latrines, scattering the dejecta and fouling the water supply, while the village councillors are very loath to issue orders to destroy these pests. Until they do so their villages can show but little sanitary improvement.

During the year quarantine restrictions were in force for plague and yellow fever against Venezuela and for yellow fever and small-pox against Brazil. No cases of these diseases occurred during the year.

VENEREAL DISEASES.

In conformity with the Report of the Royal Commission on Venereal Disease microscopic diagnosis and the Wassermann reaction are available for all practitioners by the Bacteriological Department. Leaflets have been issued, and attention is given to the subject in the lectures to nurses, dispensers, &c. Treatment for such cases is carried out in all the public hospitals, and includes the use of organic arsenic.

The Bacteriological Department continues to carry out important investigations in addition to routine work.

Colonial Medical Reports.—No. 118.—Calcutta.

REPORT OF THE HEALTH OFFICER OF CALCUTTA
FOR THE YEAR 1918.

By H. M. CRAKE, M.D., D.P.H.

Fellow of the Royal Institution of Public Health.

CLIMATIC CONDITIONS.

WEATHER conditions during 1918 were distinctly abnormal, the most noticeable variation from the normal being the defect in the rainfall. The total rainfall for the year was only 58.37 in., as compared with 70.68 in. in 1917.

The maximum and minimum temperatures recorded during the year corresponded closely with those of 1917.

The barometric curve for 1918 is a very remarkable one; after falling from 30.025 in January to 29.593 in May, the barometer remained low with hardly any variations for four months, being still 29.559 in August. It then rose rapidly to 29.875 in October, 29.948 in November, and 30.037 in December.

VITAL STATISTICS.

Death-rates.

The number of deaths registered during the year reached the appalling total of 31,371. This is the highest death-rate recorded in Calcutta since 1907. A sudden rise in the general mortality by nearly 50 per cent. involving 10,000 extra deaths, points unmistakably to the presence of a severe and widespread epidemic in the city. The principal cause of the heavy mortality was influenza.

Variations in the Mortality from Different Causes.

First and foremost comes influenza. The number of deaths registered as due to influenza was 4,115. The mortality from respiratory diseases and "fevers" both show a marked rise. A lesser rise occurred in the case of malaria and dysentery.

Plague, cholera and small-pox were all prevalent in epidemic form, and caused considerably greater mortality than in 1917.

Under normal conditions 1918 should have been a non-epidemic year, but a wild plague scare, Rajputana way, brought down thousands of up-country men who somehow or other managed to cram themselves into that already congested and overcrowded area known as Bara Bazar. They undoubtedly brought the infection with them as the early cases were clearly imported, and numerous unprotected contacts were discovered almost daily.

As in the case of small-pox, importation was probably largely responsible also for the cases of plague.

Death-rates amongst Males and Females.

As is invariably the case in the East wherever the purdah system is adopted in the slums and gullies of a congested oriental city, the mortality rate amongst females is considerably higher than amongst males. In 1918 the death-rates were: males, 30.6 per mille; females, 44.1 per mille.

The death-rate amongst males of all ages was 30.6 per mille, and amongst females of all ages was 44.1 per mille. This exceptionally high rate of mortality amongst females, particularly amongst women of child-bearing age, is a standing disgrace to the city. Whilst poverty, overcrowding and insanitary conditions all play an important part, child marriage, the untrained dhai, and the purdah system have much to answer for.

The heavy mortality from tuberculosis amongst females is clear proof of the folly of perpetuating the purdah system in the congested slums of a large city. Where, as in many parts of the city, grossly insanitary conditions prevail, the purdah system involves the constant exposure of a large section of the population to insanitary environments which must lower the powers of resistance. The zenana is almost invariably ill-lighted and ill-ventilated, fresh air and light being sacrificed for the sake of privacy.

INFANTILE MORTALITY.

Principal Causes of Deaths amongst Infants.

The recorded causes of death amongst these newly born infants are practically three in number: premature birth, congenital debility, and tetanus neonatorum. The prevention of the latter is perfectly feasible. If the dhais were replaced by properly trained midwives, tetanus neonatorum would disappear from the vital statistics of the city. The prevention of the terrible mortality from premature birth and congenital debility is a very different proposition. Whilst proper care and attention might save many of these weakly babies, this would be of little practical use whilst the root causes remain. Ignorance, poverty, child-marriage, the purdah system, venereal disease, are a formidable group for the reformer to tackle. In the forefront I place ignorance, particularly the dense ignorance of elementary facts of hygiene, which prevails in the zenana.

Colonial Medical Reports.—No. 118. Calcutta (contd.).*Birth-rate.*

The number of births registered during the year was 18,166, equivalent to a birth-rate of 20·3 per mille, calculated on the total population.

The number of male children born was in the proportion of 116 to every 100 females. The number of stillbirths was 988, an improvement on last year's figures of 1,096. Whilst a certain proportion of stillbirths merely indicate want of skilled attention during labour, the occurrence of such a large number, year after year, points to the widespread prevalence of venereal disease.

The recrudescence of plague was more severe than last year and caused 210 deaths. There is no doubt, however, that the recrudescence this year was intensified by the importation of cases, and what was of equal importance, by the excessive overcrowding in Bara Bazar, due to the influx of panic-stricken immigrants from Rajputana and other badly infected plague centres upcountry.

The outbreak of cholera was of average severity. A comparatively localized outbreak of small-pox occurred, principally in and near Bara Bazar. It was quite an exceptional epidemic, due to the importation of infection, and the overcrowding of an already congested area with a large number of unprotected persons.

Malaria, enteric and "other fevers" combined caused a very substantial increase, the most unsatisfactory feature of which is the relatively marked increase in the number of deaths from enteric.

Dysentery and diarrhoea accounted for an increase of nearly 20 per cent.

Tuberculosis.—After steadily declining for five years, during which period the mortality decreased by nearly 30 per cent., the number of deaths from tuberculosis suddenly rose from 1,539 in 1917 to 1,826. This was anticipated, as it has invariably occurred after severe outbreaks of influenza.

Influenza.—As already pointed out, the mortality from respiratory diseases (excluding tuberculosis) increased by over 2,000. Whilst it would be an exaggeration to attribute the whole of the increase in the general mortality to influenza, I am convinced that at least 50 per cent. of it was indirectly due to it.

The number of deaths from cholera was 1,526, or 1·7 per mille. This compares very unfavourably with last year's figures, 866 deaths, or 0·96 per mille. As I have already stated, however, 1917 was a record year, the cholera mortality being the lowest recorded for twenty years.

As thousands of people bathe in the Ganges every day, it is undoubtedly a very potent factor in the spread of cholera, which will never be eradicated as long as the practice of bathing in polluted water so extensively prevails. It will never be controlled until cases are promptly removed to hospital, where their discharges are properly disinfected.

Small-pox.—The outbreak this year was alto-

gether unexpected. A remarkable feature of this outbreak is the fact that it was largely confined to Hindus.

Females were attacked more frequently than males. Nearly one-half of the total mortality from small-pox occurred amongst infants and children under 5 years of age.

The mortality from measles has been prevalent in epidemic form three years in succession. Hindu children appear to be much more susceptible than Mohammedans.

The number of deaths registered from enteric was 345, or 0·38 per mille; last year the mortality was only 0·23 per mille. It is extremely disappointing to find such a sudden rise this year.

The high rate amongst non-Asiatics, coupled with the heavy local incidence in the European quarters of the city, appears to indicate increased susceptibility amongst Europeans. Females are slightly more susceptible than males.

The number of deaths recorded as due to malaria was 1,158. As there is an increase in both malaria and other fevers in three out of four districts, there can be no question of the increased prevalence of malaria this year. Mohammedans suffered more than twice as severely as Hindus. Females appear to be more susceptible than males. Up to 5 years of age children of both sexes are equally attacked.

Deaths from dysentery, diarrhoea, enteritis and puerperal diarrhoea or "enteritis," are all registered under this head. The number of deaths from these causes was 3,911, or 3·4 per mille, as compared with 2,577, or 2·9 per mille, in 1917.

The most unsatisfactory feature of this group of diseases is that after declining from 2,636 deaths in 1913 to 2,176 in 1915, the mortality has been steadily rising ever since.

Hindus suffered more severely than either Mohammedans, non-Asiatics or "other classes." Females appear to almost twice as susceptible as males.

Tuberculosis.—The mortality from tuberculosis rose from 1,539 or 1·7 per mille in 1917, to 1,826 or 2·0 per mille. The effect of epidemic influenza in raising the death-rate from tuberculosis is so well known that there is every reason to believe that the rise recorded above is due solely to the outbreaks of influenza in June and September.

The one common factor, appallingly frequent, in all parts of the city is insanitary housing. There are thousands of cases of tuberculosis in Calcutta, probably 10,000 at least. The great majority of these live in ill-lighted, ill-ventilated rooms, only too frequently overcrowded as well. With very few exceptions, every person suffering from pulmonary tuberculosis, man, woman or child, spits promiscuously all over the place. The spread of the disease is inevitable under these conditions, particularly when the contacts are enfeebled by under-feeding and the struggle for existence under adverse conditions.

The death-rates amongst Hindus and Mohammedans were almost identical. Amongst Indian

Christians, however, the mortality rate was much higher. This community is extremely poverty-stricken, its members being cut off by orthodox relatives on embracing Christianity, and often having a hard struggle to live. It is significant that the district with the highest mortality from tuberculosis houses 50 per cent. of the total Indian Christian population. The saddest feature of tuberculosis in Calcutta is the terrible mortality amongst young women of child-bearing age.

The number of deaths from respiratory diseases (excluding pulmonary tuberculosis) was 6,914, or 7.7 per mille, as compared with 4,769, or 5.3 per mille. In 80 per cent. the increased mortality occurred from pneumonia and chronic bronchitis. The great increase in the number of deaths from pneumonia points to the inclusion of cases of influenza with complications. In the case of chronic bronchitis the increase shows the difficulty of deciding the actual cause of death, when a chronic invalid contracts an acute disease.

Although more or less prevalent at all ages, pneumonia is particularly fatal amongst adults from 20 to 40 years of age, over 50 per cent. of the total mortality occurring at these age-periods; females appear to be less susceptible than males.

Broncho-pneumonia.—This is most prevalent amongst infants and children 1 to 5 years of age, over 40 per cent. of the deaths occurring at these age-periods.

Influenza.—Towards the end of June a few groups of cases of fever of short duration almost dengue-like in character occurred. These early cases were mild in character and attracted little attention. During the first week of July the disease began to assume epidemic form.

Once the stage of invasion was passed, the lightning-like rapidity with which it spread all over the city baffles description. I have never seen any epidemic of such a truly explosive character. It is no exaggeration to say that all classes of the community in all parts of the city were attacked. In students' hostels and big offices actual counts showed that fully one-third of the staff were attacked. The postal and tramway services were disorganized and the conservancy of the town suffered greatly owing to the number of coolies attacked. All departments of the Corporation, including my own, were temporarily paralysed, approximately 50 per cent. of the staff being attacked. My impression is that during the rise of the epidemic males, particularly those employed out of doors, suffered severely. Later on once the infection was carried to the home, the rest of the family was attacked, often every individual member of it.

There can be no question that the epidemic was

influenza. I arrived at this conclusion on clinical grounds during the early stages of the epidemic, and as soon as material was available for examination the diagnosis was confirmed bacteriologically in the municipal laboratory.

The extremely rapid and widespread diffusion almost tempts one to revert to the old idea that the infection is aerial in the sense that it is actually carried far and wide by the wind. The actual facts appear to be that the disease is intensely contagious, its incubation period is very short and practically everybody is susceptible. In the early stages the secretions of the nasopharynx appear to be extremely infectious, and the disease is almost certainly spread by "droplet infection." Handkerchiefs, glasses, cups, spoons, &c., used in common are also factors in the spread of the disease as well as the filthy habit of promiscuous expectoration.

WORK OF THE SANITARY DEPARTMENT.

The work of improving insanitary buildings in selected areas by systematic action taken under section 446 has been continued with satisfactory results.

The total number of bakeries inspected during the year was 226; 97 places were improved during the year. The majority of the bakeries are in a very bad condition.

All the grog shops in the city were inspected and reported on during the year. The defects generally noticed in these shops were want of privies, urinals and drainage arrangements. The required improvements were subsequently carried out in some of these shops.

All the aerated water factories in the city were inspected during the year and necessary improvements were carried out.

There are eighteen vaccination stations in the city. The total number of vaccinations (primary vaccinations and revaccinations) done during the year was 33,301. This represents an increase of 2,879 vaccinations over the figures for 1917.

There were only thirteen cases under the Vaccination Act. Convictions were obtained in nine cases and four cases were otherwise disposed of. The total number of notices issued during the year was 3,501.

There were no special features in the work done by the mosquito brigades during the year.

The outturn of the work compares favourably with that of the previous year, although during the last two months of the year (November and December) they were exclusively employed in connection with the measures adopted for the prevention of the influenza epidemic.

Colonial Medical Reports.—No. 119.—Bengal.

REPORT ON THE WORKING OF HOSPITALS AND DISPENSARIES FOR THE YEAR 1918.

By THE HON. COLONEL J. K. CLOSE, M.D., I.M.S.

Officiating Surgeon-General.

CALCUTTA.

June 18, 1919.

CALCUTTA HOSPITALS AND DISPENSARIES.

THE Calcutta medical institutions were twenty-two in number, the same as in 1917.

Altogether 439,806 patients were treated in the above twenty-two institutions as compared with 438,404 in the previous year. Of these 405,103 were out-patients, showing a slight falling off from the numbers in the previous year, 406,832, but this was more than compensated by the increase in the number of in-patients from 31,572 to 34,703; a large part of this increase was due to the prevalence of influenza.

This increase was largest in the case of the Campbell Hospital, being 30 per cent. above the previous year's number. 1,637·58 in-patients were on an average treated daily—an increase of 22·42 over the daily average for 1917. The mortality was much higher than in the preceding year, being 15·08 per cent. as compared with 10·78.

It is interesting to note that since the beginning of the war eighty-seven military officers, four warrant officers, and fifteen non-commissioned officers and men have been treated in the Presidency General Hospital.

The number of beds was 2,438, an increase of 111, but most of these were in temporary buildings improvised for the accommodation of cases of influenza.

There is a great need for some home or refuge for incurables who use up accommodation in the hospital that would be more suitably occupied by surgical patients and cases of acute disease.

The nurses of all the hospitals in Calcutta have performed their duties in a most praiseworthy manner. Their number, however, is far short of what is desirable, and this is especially the case at the Campbell Hospital, where the real nursing is done by students helped by ward coolies and other menials supervised by the nurse in charge. This is a matter which requires to be taken up when normal conditions return.

The existing nurses' quarters at the Medical College hospitals being inadequate, a scheme for a new Nurses' Home was drawn up. It has been approved this year. The land has already been acquired, and the work of construction is expected to be commenced soon. It is also proposed to build new quarters for the nurses of the Presidency General Hospital, as the present quarters are unsatisfactory and the accommodation is insufficient.

The honorary surgeons and physicians of both the Mayo and Sambhu Nath Pandit Hospitals took a keen interest in their work, and were a great help to these hospitals.

Diseases.—Influenza.—The recorded number of deaths from this disease among the general population of the town was 4,115. Patients treated in hospitals for influenza numbered 16,784, of whom 2,777 were in-patients, with 849 deaths. Besides these, a good many influenza patients were treated at their houses by itinerant doctors employed by the Calcutta Corporation and the Howrah Municipality.

Both *cholera* and *small-pox* prevailed epidemically in the town, and the death-rate among the general population from these diseases rose from 0·96 and 0·03 per mille respectively in 1917 to 1·7 and 1·6 per mille in 1918. Sir Leonard Rogers' treatment of cholera is in use in all the hospitals, and the results are steadily improving.

The city was free from plague from August, 1917, to February, 1918, and again from September to the end of the year. Seventy-seven patients were treated in hospitals, mostly in the Campbell Hospital, with forty-six deaths.

The number of patients treated for tubercle of the lung was less than in the previous year, but the death-rate was higher. Among the general population, the deaths increased from 1,433 to 1,763.

Feveral Diseases.—The number treated for these diseases was 17,155. Salvarsan or its substitutes were used to an increasing extent in the Calcutta hospitals, and it is hoped to extend their use still further.

There was a falling off in the surgical work of the Calcutta institutions, only 37,716 operations having been done as compared with 46,210 in the preceding year. The decrease occurred in almost all hospitals. The outbreak of epidemic influenza was no doubt responsible to a great extent for this falling off; selected and important operations were, however, not affected.

DISTRICT HOSPITALS AND DISPENSARIES.

On January 1 there were 724 hospitals and dispensaries of various classes, fifteen more were opened and one closed during the year, which brought the total number of institutions outside Calcutta to 738.

Besides the above, local medical practitioners were induced by the District Board of Jessore to settle at nine centres and render medical aid to the poor free of cost, in consideration of an annual subsidy from the Board. Another dispensary of this nature was also started in the Gopalganj subdivision in the district of Faridpur. These subsidized dispensaries are reported to be working fairly well. A sub-assistant surgeon was appointed by Government for itinerant work in the Chittagong Hill Tracts.

Altogether 6,368,171 persons received medical aid at the various classes of hospitals and dis-

dispensaries outside Calcutta. The floating dispensary started in the district of Bakarganj in 1917 was also in operation last year. The death-rate among the indoor patients was 7.57 per cent. as compared with 5.45 per cent. in the preceding year. The higher death-rate is due to the admission of a good many influenza, pneumonia and cholera cases in a moribund condition.

There is nothing to add to what has previously been said as to the arrangements for the nursing of patients in mofussil hospitals, except that a nursing scheme for the new Mymensingh Hospital is under consideration, and that a fund to finance it has already been started under the name of the "Victory Memorial Fund." In the meantime an Indian nurse has been appointed to this hospital.

Diseases.—Nearly one-third of the total number treated were malaria patients. Treatment with injection of quinine was adopted in a good many intractable cases with good results.

Influenza patients attended hospitals and dispensaries for treatment, of whom 1,526 were

treated as in-patients, and among these there were 339 deaths.

Veneral Diseases.—There were 61,057 patients treated for venereal diseases, viz., 34,122 for gonorrhoea and 26,935 for syphilis. Very few of them could be treated with salvarsan or its substitutes on account of the high prices of those drugs.

Kala-azar.—In almost all cases the patients were treated with tartar emetic injections with a great measure of success.

Surgical Operations.—A decrease is noticeable in the surgical work of mofussil hospitals. The decrease is mainly due to the exclusion from the operation statement of simple operations such as extraction of loose teeth. The outbreak of influenza also interfered with surgical work to a large extent. Operation cases had to be refused admission owing to the wards being full of influenza patients.

Extraction of the lens forms the largest number among important operations, viz., 1,342.

Colonial Medical Reports.—No. 120.—Falkland Islands.

ANNUAL MEDICAL REPORT FOR THE YEAR 1918.

By **JOHN CRADDOCK,**

Acting Colonial Surgeon.

STANLEY.

November 20, 1919.

THREE patients remained in from 1917. Sixteen patients admitted (three females, thirteen males) with the following results: One death; twelve cured; three relieved.

Two patients were admitted from ships (both whaling vessels).

The K.E.M. Hospital is still not sufficiently used by gynæcological patients resident in Stanley. More general operations might have been done had it not been for the unavoidable inadequate medical and nursing staff in Stanley. While only one qualified nurse and one medical man are available, it is quite impossible to perform serious operations other than emergency cases, and as a result many patients were advised and actually went to South America for surgical treatment. Twenty-four patients (twenty-one gynæcological) were treated by the nurse matron in their own homes.

Government School.—The children were medically examined at intervals. The difficulty of the treatment of children requiring minor operations was similar to the previous year pending the arrival of a second medical officer. The condition of the children's teeth was still very unsatisfactory owing to the children not attending the Colonial Dentists' Surgery regularly.

Quarantine.—Forty-nine vessels were given pratique. No infectious cases were seen; two

cases were admitted to the K.E.M. Hospital, one a head injury from Monte Video, one a case from South Georgia.

PUBLIC HEALTH.

Exanthems, six cases of chicken-pox. Phthisis, six cases. Of the latter five cases were either from the camp or outlying islands, and consequently treatment was commenced too late to be of much service.

The Board of Health reported fully on the condition of the roads and drains in Stanley; unfortunately, owing to the difficulty of materials and labour, little could be done at the time to carry out its suggestions.

During the latter months of the year there was a mild epidemic of influenza. (During this time "Spanish influenza" was raging in Europe and South America.) No deaths occurred from it on the East Falkland, but two cases, I understand, died on the West Falkland from broncho-pneumonia following influenza.

In Stanley two forms appeared; one in which the intestines were affected; this was chiefly in younger patients, the second in older people in which the lungs and bronchial tubes were chiefly affected.

THE CAMP.

There was very little sickness in the camp, the majority of cases being either accidents or mil-wifery cases. Some of the stations were not visited at all and some only in passing.

Colonial Medical Reports.—No. 121.—New South Wales.

REPORT OF THE DIRECTOR-GENERAL OF PUBLIC HEALTH FOR THE YEAR 1918.

By ROBERT T. PATON, F.R.C.S.Ed., M.D.Brux.

PUBLIC HEALTH LEGISLATION.

BILLS were prepared for amendment of the Pure Food Act, the Public Health Act, and the Dairies Supervision Act; to regulate ambulance transport services; and for control of venereal diseases, but only the last-named became law.

The provisions of this Act are designed to secure the proper treatment and cure of persons suffering from such diseases, and to prevent the conveyance of infection to others. The Department has been taking active steps to secure facilities for treatment of such patients, and other preliminary measures, to assist in the working of the Act when it becomes operative by issue of a proclamation. It was found necessary to defer issue of such proclamation in the early months of 1919 owing to public hospitals and other places where work in connection with venereal diseases will be carried on being fully occupied with patients suffering from influenza, the spread of which throughout the whole State in the first half of 1919 cast an unusually heavy burden on the whole Department.

PURE FOOD ACT.

Disinfectants.—Special attention was given to the manner of sale of disinfectants, more especially in regard to labelling, as extravagant and misleading claims were frequently made concerning the germicidal value of these substances. The containers in which they are sold also received consideration. Owing to the frequency of accidents arising from the sale of these poisonous fluids in bottles used for ordinary beverages, it was found necessary to alter the Regulations to prohibit this practice.

Ice Cream and Ices.—Attention was given to the storage, preparation, and delivery of this article of food, and prosecutions were necessary in many instances.

Milk Supply of Sydney.—In connection with the milk supply of Sydney and suburbs the advisability or otherwise of pasteurization has several times been considered, and an effort made to expedite delivery. Many difficulties have to be overcome in getting milk to the metropolitan consumer in the best possible condition and minimum period of time. Every effort is made by the Department to ensure purity of the milk supply and cleanliness of handling.

Milk Supply in relation to Infantile Mortality.—There has been a steady decline in the infant mortality rate from 1886, the year in which the Dairies

Supervision Act became law. In that year the mortality rate of infants under 1 year was 128 per 1,000; in 1908 it had fallen to 76 per 1,000, and in 1918 to 59·8 per 1,000. For the year 1917 the rate was the lowest recorded, being only 57·56 per 1,000. The foregoing rates apply to the whole of the State; in the metropolitan district the death-rate was slightly higher. The medical officer of health for the metropolitan district points out that these figures represent the lowest recorded death-rate of infants in any city of over half a million inhabitants.

POSSIBLE OVERLAPPING IN ADMINISTRATION OF THE DAIRIES SUPERVISION AND DAIRY INDUSTRY ACTS.

In regard to the alleged clashing of interests I desire to point out that the work of the officers of the two departments is for entirely different purposes that of the Department of Agriculture being purely instructional and technical in relation to the manufacture of butter and cheese, and to the selecting and breeding of the most suitable cattle for dairying purposes; that of the Health Department relating to inspections regarding the sanitary condition of premises and utensils, and the freedom of the dairy herd from diseases dangerous to human beings, followed if necessary by prosecution or other deterrent action.

INFECTIOUS DISEASES.

New South Wales was comparatively free from most forms of infectious disease in 1918.

Fewer cases of typhoid fever were reported than in any year from the introduction of notification in 1898. The number of scarlet fever and diphtheria cases also showed a considerable decrease. In April and May a number of diphtheria cases were reported in the metropolitan district, and for a few weeks a great demand was made on the isolation accommodation at the Coast Hospital—at one time 200 diphtheria cases being under treatment there. From the middle of the year the number of cases steadily declined.

No serious outbreak of the ordinary infectious diseases occurred in the metropolitan area, other than an outbreak of scarlet fever on the H.M.A.S. *Tingira*, where some fifty-three cases occurred within three days. All the affected persons were removed to the Coast Hospital, and no further cases were reported from the vessel.

In 1918 a number of cases of a disease with high mortality, resembling somewhat cerebro-spinal meningitis, was reported from several north-western and western towns.

Protection against Typhoid Fever.—Since 1913 the Department has frequently pointed out the advantages of anti-typhoid inoculation as a means of protection against contracting typhoid. The value of inoculation has been forcibly demonstrated by the relative immunity of the troops from this illness. It is desirable that residents in any of the country districts which are subject to typhoid fever outbreaks should avail themselves of this protection.

It cannot be claimed that inoculation against typhoid fever confers absolute immunity, yet in those persons who do become infected, the disease tends to run a milder course, with a much diminished mortality.

PNEUMONIC INFLUENZA.

In September, notwithstanding disquieting reports from England, South Africa, and elsewhere of devastating outbreaks of pneumonic influenza, up till the end of the year no case occurred in Australia, although numerous patients from infected ships were detained in quarantine stations at different ports, but principally at Sydney.

Precautionary Measures.—Among the many matters that received attention the following may be mentioned:—

Hospital Accommodation.—Special arrangements were made at the Coast Hospital for reception of cases, and for the temporary military wards which had been erected there some time previously to be evacuated.

Inspections were made of several buildings, and a large skating rink was selected as being one of the most suitable of the places available for use as an emergency hospital in case of need.

In view of the fact that the public schools would need to be closed in the event of an outbreak, the Education Department was consulted, and school buildings were made available to the Department.

A number of beds were on order for the new pavilions, and arrangements were also made for the supply of stretchers and bedding as occasion might require.

The tramway authorities placed their ambulance tramcar at the Department's disposal, and in addition to the departmental ambulances available, the metropolitan ambulance transport brigades were asked to place their vehicles at the disposal of the Department.

Protective Measures.—Arrangements were made to secure several inhalations and sprays for use in case of necessity. Fixed steam sprays were installed at the Health Department and the Water Police Court building, and portable sprays were obtained for the use of contacts in their own homes. The subject of masks also received special consideration.

Inoculation.—Material was obtained from pneumonic influenza patients at the Quarantine Station, and large quantities of vaccine were prepared in the microbiological laboratory, which was issued free of charge to medical practitioners. Public inoculation depots were opened, and upwards of 30,000 persons

were inoculated at these depots by the end of the year. Considerable assistance was rendered by voluntary aids at these depots.

Administrative Measures.—Cabinet decided to appoint an administrative committee, and also to ask the local branch of the British Medical Association to appoint a consultative council of medical men to assist the department in controlling the disease in the event of necessity arising.

In December, pneumonic influenza was proclaimed a notifiable disease under the Public Health Act, in order that early information might be obtained of the occurrence of any suspicious cases, and numerous other precautionary measures were also taken.

SANITATION.

Garbage and Refuse.—In certain portions of the metropolitan area the method of disposal is still very unsatisfactory. In the more progressive districts incinerators are in operation. The original Public Health Act, passed in 1896, contained a provision for councils to conjointly erect destructors, and the results have been satisfactory wherever this provision has been taken advantage of.

Ventilation of City Restaurants.—A special investigation was made by the acting medical officer of health, who reported that many of the premises at present in use as eating-houses are quite unsuitable for the purpose, and recommended that power should be obtained for the licensing of such premises. The amending Public Health Bill, which has been prepared, contains a clause dealing with this matter.

Picture-show premises and theatres are now regularly cleaned out, disinfected, and otherwise properly attended to; suitable lavatory accommodation is also provided.

Country Town Inspection.—The constant and steady decline in typhoid fever is largely due to action taken by local authorities as a result of these regular inspections by departmental officers.

NUISANCES.

Several inspections were made to ascertain the cause of offensive odours at Rose Bay. It was ascertained that at times during the year seaweed is deposited on the beach by the prevailing winds; the seaweed decomposes rapidly, and gives off a very offensive smell.

Unhealthy Building Lands.—To prevent, as far as possible, the erection of buildings on unsuitable or unhealthy sites, a circular was sent to shire and municipal authorities throughout the State, requesting that inspections might be made by their officers, and a report furnished, of any low-lying or unhealthy land which the local authority considered should be proclaimed as unfit for building purposes.

PUBLIC HOSPITALS.

Mental Rooms at Country Hospitals.—It is imperative to emphasize the necessity for having a

room available for the reception and treatment of persons suffering from acute insanity or alcoholism, &c., pending their transfer to a mental hospital. Such a room should be provided at every subsidized hospital.

Treatment of Venereal Cases in Country Hospitals.—Much of the congestion in the metropolitan hospitals is due to patients suffering from venereal diseases being sent to Sydney instead of being cared for locally; committees of local hospitals are therefore informed that they must treat venereal cases occurring in their district, as there is no substantial reason why such patients should not be admitted to a general ward, provided precautions are taken for the proper disinfection of the utensils, &c., used by them.

PRIVATE HOSPITALS.

Throughout the year it has been possible to carry out a systematic inspection of private hospitals in country districts.

Insufficient Accommodation at Private Hospitals for Treatment of Infectious Cases.—Representations have been made that insufficient beds are available in the metropolitan district for cases of infectious disease occurring among the more well-to-do classes, especially among visitors to the city who may be staying at boarding-houses or hotels. A proposal has been made to establish three small cottages at the Coast Hospital for use as private wards by persons suffering from infectious diseases who can afford to pay for such accommodation. A plan for erection of one cottage at an estimated cost of £476 has been prepared, with a view to ascertaining how far it will meet requirements, and what demands are likely to be made upon it.

TUBERCULOSIS.

The medical superintendent draws attention to the necessity for separate institutions for the treatment of early and advanced cases; and also to the need for the initiation of a comprehensive scheme of employment, so that cured consumptives when fit to return to work will be able to find suitable and profitable employment awaiting them. The work chosen should be congenial and remunerative; it must not be too heavy or too hard.

Granting of Pensions to Consumptive Patients.—The Board of Health had under consideration the question of granting invalid pensions to advanced consumptives, with a view to some steps being taken to induce such pensioners to enter a sanatorium or other suitable home, where they could receive proper treatment. Institutional treatment of such cases is very desirable in the interests of other members of the community.

Conveyance of Consumptive and other Sick Persons by Rail.—The department has been in correspondence with the Railway Commissioners on this subject, and suitable arrangements have now been made for such sufferers to be conveyed without menace to the travelling public.

STATE HOSPITALS AND ASYLUMS.

The policy of the department is to make these institutions self-contained as far as practicable, and inmates who are sufficiently well are encouraged to assist in the farm operations and in the workshops, for which they receive a small daily gratuity either in cash or kind. Tailoring and bootmaking is done by inmates at Macquarie Street; and general sewing and laundry work at Newington.

LADY EDELINE HOSPITAL FOR BABIES, GREYCLIFFE, VAUCLUSE.

This institution has continued its good work of saving infant life. A new ward of twenty beds was erected, and named the Rosalind Black Ward, in memory of the late Mrs. George Black, who took a very great interest in the hospital.

CONVALESCENT HOSPITALS AT EASTWOOD (MEN) AND ROSE BAY (WOMEN).

These hospitals continue to prove a boon to persons regaining health after protracted illnesses or serious operations. In the Strickland Convalescent Hospital for Women, "Carrara," Rose Bay, 522 women benefited greatly by the stay of from two to four weeks, their general health showing rapid improvement as a result of the rest and change in the pleasant surroundings of this hospital.

Patients are admitted to these institutions from all metropolitan hospitals, the majority being convalescent medical and surgical cases. The usual stay is from two to four weeks.

RAT DESTRUCTION AND PLAGUE.

Attention has from time to time been drawn to the necessity for strict observance of the regulations regarding rat-guards, and inspections made at Newcastle disclosed some laxity on the part of shipmasters in this respect. Several convictions were obtained as a result of prosecutions.

Rats at Railway Depots.—The attention of the railway authorities was drawn to the special danger from prevalence of rats at depots where grain was handled.

Other Preventive Measures.—Municipal and Shire Councils have been circularized from time to time, and urged to take steps for the destruction of rats within their districts.

Bacteriological Examinations.—Over 8,000 rats trapped in the city and on the wharves were examined in the laboratory, but no plague-infected rat has been found since April, 1910.

MICROBIOLOGICAL LABORATORY.

The report of the principal microbiologist shows that 10,810 general examinations were made during 1918. Of these 3,519 were examinations of throat swabbings, &c., for diphtheria, and 2,226 were of sputa to ascertain if tubercle bacilli were present. Examinations made in connection with venereal

diseases totalled 2,156, of which 1,709 were blood test for syphilis, and 447 for the causative organism of gonorrhœa. The number of Widal reactions for typhoid fever was 692.

GOVERNMENT MEDICAL OFFICERS FOR SYDNEY.

The whole of the medico-legal work required in

the metropolis is carried out by these officers, who in addition are also charged with duties in connection with the various public services. As pointed out by Dr. Palmer, the Government medical officers for Sydney are available for duty at all hours; and are called upon to perform work requiring a wide medical and general knowledge.

Colonial Medical Reports.—No. 122.—Trinidad and Tobago.

MEDICAL REPORT OF THE ACTING SURGEON-GENERAL FOR THE YEAR 1918.

By F. A. de VERTEUIL,

Acting Surgeon-General.

COLONIAL HOSPITAL,

PORT-OF-SPAIN,

February 15, 1919.

THE Extern Maternity Department which was inaugurated in July, 1914, continues to do much useful work. Not only does it relieve the strain on the limited accommodation of our maternity ward but it helps in the campaign to reduce infantile mortality in Port-of-Spain. During the year 201 women were delivered at their homes by our Nurse-Midwives without any fatality. These cases received daily attendance during the first ten days of the puerperium which necessitated 2,328 visits. Apart from these attendances there were 158 visits to infants to note their condition and progress and to instruct the mothers as to their proper care and feeding. There were also 140 visits to expectant mothers to whom directions were given as to the management of their pregnancy.

Mothers' and Infants' Clinic.—The Mothers' and Infants' Clinic which had been recommended by the late Surgeon-General Dr. Clare, was opened on January 2, 1918, and was placed under the immediate charge of the Assistant Resident Surgeon, subject to the control of the Resident Surgeon. On November 25, 1918, it was handed over to the Baby Welfare League, which is now responsible for its management.

Sanitary Arrangements.—Arrangements for the removal of the night soil are established on the water carriage system, and all refuse from the wards and grounds is burnt in the incinerator on the premises.

Owing to overcrowding in the chronic wards the sanitary conditions were, in many respects, unsatisfactory.

Accommodation.—The authorised number of beds in this institution is 340. The greatest number of patients in hospital on any one day was 399; the

lowest number 293; and the average for the whole year, 345.

There was much overcrowding during practically the whole year, and this was more severely felt in the chronic wards.

The Poor Relief System here requires revision. At present there is little distinction between the deserving poor and the vagrant. Efforts should be made to extend to the sick poor facilities for promptly obtaining medical attendance when needed, while idlers should be dealt with under a vagrancy law.

The establishment of an up-to-date out-patient department at the hospital is a question which demands early attention.

With regard to the admission of senile and incurable cases into hospital, it is to be hoped that the Municipality will shortly make complete provision for its aged and incurable poor. At the close of the year there were no fewer than 65 cases or 18 per cent. of the inmates in the hospital awaiting admission to the House of Refuge. To that extent, therefore, was the institution transformed into an almshouse and its usefulness for the admission and treatment of the sick impaired.

Mortality.—Among 5,302 patients treated during the year there were 740 deaths. Several causes operate to swell our mortality rate. Many patients are brought to hospital in a hopeless condition, for instance, no fewer than 195 cases died within 72 hours of admission. While no doubt ignorance and indifference play their part, the lack of a proper Poor Relief System is also responsible for this unsatisfactory state of things.

The number of deaths among the cases of Pulmonary Tuberculosis which were admitted in the last stage of the disease and also among the senile and incurable cases awaiting transfer to the House of Refuge accounts to some extent for the high death-rate.

R. SEHEULT,
Resident Surgeon.

Colonial Medical Reports.—No. 122.—Trinidad and Tobago
(continued).

SAN FERNANDO HOSPITAL.

The accommodation at this institution continues to be very severely taxed and overcrowding has never been so pronounced as during the last year.

The daily total average number of admissions (including two months during which the male wards were unavailable) was 111.

The total number of deaths was 393, giving a percentage mortality on cases treated of 11.67 per cent.; 78 deaths occurred within forty-eight hours of admission, and 59 within seventy-two hours.

Ankylostomiasis continues to show a definite increase.

Until the villages are supplied with a good water supply and efficient latrines, and the use of the latter made compulsory, one can expect very little reduction in the spread of this disease in the Southern Districts. It has been my experience that the administration of one of the anthelmintics (chenopodium oil or thymol) in a mild dose is far more reliable for diagnosing the condition than examination of the feces for ova. In many cases it is found that where several independent microscopic examinations of the feces for ova yielded negative results, yet the patient may still be suffering from a very heavy infection.

Malaria.—There has been no marked reduction in the number of cases admitted.

Enteric Fever.—Admissions 142, deaths 38. Among the fatal cases the following complications occurred: Intestinal hæmorrhage, 3; broncho-pneumonia, 3; perforation of intestines, 2; albuminuria, 2; hyperpyrexia, 1; ulceration of vulva, 1; dysentery, 1.

Pneumonia (Influenzal).—During October twenty-five patients succumbed from this disease, which was epidemic in character and of a very virulent type; very few were in hospital longer than forty-eight hours.

Dysentery (Amœbic).—The deaths from amœbic dysentery numbered forty-eight, of these only thirteen were uncomplicated by some other disease.

The liability of this disease to recur, when it has become chronic, in consequence of the fact that emetin, hypodermically, is unable to rid the patients of the cysts has led to the introduction of a method of treatment by a combination of emetin, hypodermically, with emetin bismuth iodide "per os." The combination with those of large enemata containing emetin will almost invariably result in effecting a cure by getting rid both of the amœbæ and the cysts. In view of the fact, however, that emetin bismuth iodide is a very expensive drug, and observations at this institution having revealed that patients admitted suffering apparently from ankylostomiasis only, very often, after the administration of ol. chenopodium, exhibited dysentery or colitic stools containing *Amœba histolytica* with which they were evidently infected in its latent form, it was decided to utilize "ol. chenopodium" as a means of getting rid of the cysts after the patient had been first relieved of all of the acute symptoms

by the administration of emetin, hypodermically. The results obtained have been entirely satisfactory.

Tetanus.—Eight cases; four deaths. One case which recovered occurred in a child aged 18 months, who was treated with three-quarters the usual dose of antitetanic serum.

An hereditary lack of resistance to the toxin of tetanus may possibly be inferred from the fact that the brother of one patient, who succumbed as a result of a rose thorn puncturing her finger, had also died of tetanus from an exactly similar cause.

INJURIES.

"*Rupture of Mesentery*."—A youth, 19 years old, was admitted with the history that a cart which he was driving capsized and fell on him. On examination he was found to have symptoms of intra-abdominal hæmorrhage. His condition was becoming increasingly grave. Under chloroform-ether anæsthesia, his abdomen was opened and found to contain a large quantity of blood. The spleen and other organs were found to be uninjured. The source of the hæmorrhage was traced to a rupture in the gastro-colic mesentery which was controlled by ligatures and the abdomen washed out and closed. This youth was the subject of several curious developmental malformations: (a) Liver was so divided as to possess an additional lobe; (b) both ears—the antitragus was absent; (c) both feet possessed only four toes each. He subsequently developed both dysentery and pneumonia, but ultimately made a complete recovery.

"*Rupture of Pncreas*."—A young man, aged 23 years, was admitted with the history that he had fallen between the railway platform and the foot-board of a moving train, and as his body revolved he was severely squeezed around his waist, being carried along some distance. He was very intoxicated, but gradually developed signs of progressive intra-abdominal hæmorrhage. Under chloroform-ether anæsthesia, his abdomen was opened and found to contain a large quantity of blood which was traced to a large hæmatoma bulging forward between the stomach and transverse colon, the clots of blood were located and the source was found to be the pancreas, which had ruptured. A drainage tube was sutured into the rupture, the abdomen washed out. A pancreatic fistula persisted for some time but ultimately closed, the patient being discharged from hospital two months later.

Intestinal.

"*Acute Gangrenous Appendicitis—Perforation*."

—A moderately nourished man, aged 35 years, was admitted with signs of general peritonitis and history pointing to appendicitis. Under chloroform-ether anæsthesia, his abdomen was opened, revealing general purulent peritonitis caused by a gangrenous appendix which had ruptured. The appendix was removed, stump buried, abdomen drained, resulting in recovery.

"*Acute Gangrenous Appendicitis—Perforation*."

—A youth, aged 19 years, was admitted with symptoms as in the previous case. He was treated in a like manner. That both cases survived is pro-

bably due to the post-operative treatment by Fowler's position with proctoclysis.

"*Acute Appendicitis in Hernial Sac.*"—An infant, aged 9 months, was admitted with a distended abdomen and symptoms suggestive of a strangulated inguinal hernia. Under chloroform, the sac was exposed and opened; the caecum with appendix, the apex of which was sloughing, was found. Appendicectomy was performed, the bowel restored to the abdominal cavity, the hernial sac excised and inguinal canal repaired. The wound suppurated slightly, but recovery finally resulted.

"*Enteric Fever, Perforation of Intestine.*"—An East Indian boy, aged 10 years, was admitted with general peritonitis, history of enteric fever. He was also suffering from advanced ankylostomiasis. The abdominal cavity was opened with cocaine anaesthesia, revealing general purulent peritonitis. Ether was then administered and in the small intestine an enteric ulcer was found which had perforated, this was closed by suturing, and a second ulcer which was on the verge of perforating was invaginated. Drainage in Fowler's posture with proctoclysis and stomach lavage for thirty days caused ultimate recovery. After convalescence, he was treated for ankylostomiasis and left hospital well two months after.

"*Acute Intestinal Obstruction—Ascarides Lumbricoides.*"—A boy, aged 8 years, was admitted with acute intestinal obstruction produced by the impaction of a mass of *Ascarides lumbricoides* in the lower portion of the ileum. Laparotomy under chloroform-ether anaesthesia revealed serous effusion into the abdominal cavity with recent lymph exudation over the area of the intestine involved. By massage the worms were manipulated into the caecum and ascending colon and the acute symptoms all disappeared, while anthelmintics, administered after he had recovered from the effects of the anaesthetic, completed his cure.

"*Ruptured Mesenteric Cyst.*"—A fat woman, aged 30 years, was admitted with signs of an "acute abdomen." Under chloroform-ether anaesthesia the abdomen was opened and revealed a cystic tumour situated between the layers of the mesentery attached to the descending colon and pushing the latter forwards. The cyst had a small rupture, and its contents which were sero-purulent was leaking into the abdominal cavity. It was completely evacuated, the cyst walls excised and a drainage tube left *in situ*. Recovery.

Pancreatic.

"*Acute Haemorrhagic Pancreatitis.*"—A well-nourished woman was admitted, aged 21 years, with the history that she was seized, while working in the fields, with severe pains over the epigastrium, vomiting and sudden collapse, forty hours previously. On admission her abdomen was distended, especially so above the umbilicus; her pulse was 130, temperature 100° F. Lavage of her stomach had no influence in reducing the distention, although her bowels acted well after enemata. Under chloroform-ether anaesthesia her abdomen was opened and found to contain a large quantity of blood and some

fat necrosis which was finally traced to the pancreas, which was in a haemorrhagic state and engorged with blood. The pancreas was incised, a drainage tube inserted into its substance and brought out through the abdominal wound which was closed, after washing out her abdomen with saline solution. Her temperature varied between 103° F. to 105° F. for two days, after which she gradually improved. The pancreatic fistula eventually closed well. The treatment adopted was that recommended in Binnie's "Surgery."

"*Pancreatic Cyst.*"—An intensely anaemic boy, aged 12 years, was admitted suffering from ankylostomiasis and a large epigastric tumour. After a course of treatment which succeeded in eradicating the former disease, his abdomen was opened under chloroform-ether anaesthesia over the site of the tumour, which proved to be pancreatic in origin. An opening was made through the gastro-colic omentum and the cyst, which could not be enucleated *in toto*, shut off by suturing from the general peritoneal cavity. Four days later an incision was made into the cyst and a drainage tube fixed in position and its contents completely evacuated. Cured after four months in hospital.

"*Pancreatic Cyst.*"—A man, aged 29 years, was admitted with a large abscess of the liver, which was drained by Manson's operation and eventually healed with the aid of hypodermic injections of emetin. During convalescence he developed a large epigastric tumour, which under novocain anaesthesia, was cut down upon and exposed. It was treated in a similar manner to the previous case with a like result.

"*Abscess of Pancreas.*"—A weakly ill-nourished lad was admitted with symptoms of peritonitis of uncertain origin. Laparotomy, under a general emetin. During convalescence he developed a large collection of pus in the vicinity of the gastro-splenic region. His condition was very bad and drainage alone could be attempted, but without avoiding a fatal issue. *Post-mortem*, the source of the abscess was found to be the pancreas, which was completely disorganized and sloughing.

Gall-bladder.

"*Abscess of Gall-bladder—Rupture—Peritonitis*"—This case demonstrates how very little reliance can be placed on the history of the class of patients treated at this institution.

A man, aged 48 years, was admitted with general peritonitis and gave a history which was typical of an appendix becoming gangrenous.

The appendix was examined, after opening the abdomen through the right rectus below the umbilicus under a general anaesthetic, and found to be normal.

The duodenum was examined by an incision above the umbilicus and found also to be normal; through this incision it was able to be ascertained that the cause of trouble was the gall-bladder. These two incisions were closed after leaving a drain into the pelvis via the first incision and the gall-bladder was exposed by a third incision giving full access to that organ, which was found to be distended to the size

RETURN OF DISEASES AND DEATHS IN 1918 IN THE COLONIAL HOSPITAL, SAN FERNANDO HOSPITAL AND THE DISTRICT AND YAWS HOSPITALS.

Trinidad.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	12	1	12
Anæmia	—	—	—
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	93	20	100
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	18	4	21
Diabetes Insipidus	—	—	—
Diphtheria	8	—	9
Dysentery	—	—	—
Enteric Fever	877	184	904
Erysipelas	5	—	5
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	305	2	315
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	53	1	53
Kala-Azar	—	—	—
Leprosy	—	—	—
(a) Nodular	2	—	2
(b) Anæsthetic	12	—	12
(c) Mixed	1	—	1
Malarial Fever—	—	—	—
(a) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	680	21	694
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(b) Remittent	16	—	16
(c) Pernicious	158	33	163
(d) Malarial Cachexia	44	4	50
Malta Fever	—	—	—
Measles	3	—	3
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	—	—	—
Malignant	7	4	7
Old Age	143	70	155
Other Diseases	247	68	264
Pellagra	11	6	11
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	111	1	117
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	2	—	2
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(a) Primary	41	2	42
(b) Secondary	72	2	76
(c) Tertiary	168	23	176
(d) Congenital	16	12	20
Tetanus	24	14	25
Trypanosoma Fever	—	—	—
Tubercle—	—	—	—
(a) Phthisis Pulmonalis	—	—	—
(b) Tuberculosis of Glands	—	—	—
(c) Lupus	—	—	—

GENERAL DISEASES—continued.

(d) Tabes Mesenterica	—	—	—
(e) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	—	—	—
Yaws	7	1	7
Yellow Fever	10	—	10

LOCAL DISEASES.

Diseases of the—	Admissions	Deaths	Total Cases Treated
Cellular Tissue	398	12	415
Circulatory System	—	—	—
(a) Valvular Disease of Heart	165	56	160
(b) Other Diseases	63	34	69
Digestive System—	—	—	—
(a) Diarrhœa	336	92	344
(b) Hill Diarrhœa	—	—	—
(c) Hepatitis	14	—	14
Congestion of Liver	3	—	4
(d) Abscess of Liver	24	2	26
(e) Tropical Liver	—	—	—
(f) Jaundice, Catarrhal	6	—	6
(g) Cirrhosis of Liver	163	73	174
(h) Acute Yellow Atrophy	—	—	—
(i) Sprue	—	—	—
(j) Other Diseases	742	102	774
Ear	23	—	26
Eye	258	—	279
Generative System—	—	—	—
Male Organs	694	23	721
Female Organs	591	52	613
Lymphatic System	72	2	74
Mental Diseases	95	—	98
Nervous System	213	53	234
Nose	35	—	35
Organs of Locomotion	251	4	266
Respiratory System	1,059	349	1,114
Skin—	—	—	—
(a) Scabies	—	—	—
(b) Ringworm	—	—	—
(c) Tinea Imbricata	—	—	—
(d) Favus	—	—	—
(e) Eczema	33	—	33
(f) Other Diseases	1,065	19	1,141
Urinary System	635	174	662
Injuries, General, Local—	—	—	—
(a) Siriasis (Heatstroke)	—	—	—
(b) Sunstroke (Heat Prostration)	2	—	2
(c) Other Injuries	905	30	942
Parasites—	—	—	—
Ascaris lumbricoides	8	—	9
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	866	68	889
Filaria medinensis (Guinea-worm)	14	1	16
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	4	—	4
Corrosive Acids	2	—	2
Metallic Poisons	3	—	3
Vegetable Alkaloids	14	1	14
Nature Unknown	—	—	—
Other Poisons	54	—	55
Surgical Operations—	—	—	—
Amputations, Major	27	—	27
Minor	42	—	42
Other Operations	2,580	32	2,580
Eye	—	—	—
(a) Cataract	1	—	1
(b) Iridectomy	1	—	1
(c) Other Eye Operations	14	—	14

of an orange, with pus, and had ruptured. The gall-bladder was sutured to the parietal peritoneum and drained. The wounds all healed well and convalescence was rapid.

Thorax.

"*Extravasation of Urine—Empyema.*"—A man, aged 38 years, was admitted in an exceedingly weak state with extravasation of urine secondary to an organic stricture of the urethra. An incision through the perinæum into the membranous urethra enabled a large rubber catheter to be introduced and fixed into the bladder, while free incisions were made into the areas involved in the extravasation. He gradually improved, but ten days later developed signs of fluid in the right pleural cavity, which was explored and found to be purulent. Under novocain anæsthesia the cavity was freely opened and drained of a large collection of pus with all the characteristics, quite unmistakable, of a coli infection, proving that the thoracic infection had originated from the pelvic. Recovery.

Gynaecological.

"*Ectopic Pregnancy.*"—A woman, aged 28 years, was admitted with a doubtful history of ectopic pregnancy. A well-marked tumour could be palpated through the posterior fornix. Laparotomy under a general anæsthetic revealed a collection of fluid shut off from the general peritoneal cavity and surrounding the uterus whose contour was ill-defined. The cyst was opened and contents, which consisted of blood clots and the result of an extra-uterine pregnancy which had ruptured downwards between the layers of the broad ligaments, were removed. The edges of the cyst were sutured to the parietal peritoneum and cavity plugged with gauze. Four days later the plug was removed, a drainage tube inserted and the cavity washed out. She left hospital well six weeks later.

"*Ectopic Pregnancy—Ruptured.*"—A woman, aged 28 years, was admitted with abdominal distension and bloody vaginal discharge. Her menstrual history was regular. Cocaine infiltration of the abdominal wall enabled the abdomen to be opened below the umbilicus revealing the presence of an old ruptured extra-uterine pregnancy. Chloroform was then administered and the ruptured tube ligatured and excised. A curious condition was observed, namely, that the lower abdominal cavity was completely shut off from the upper portion by a smooth peritoneal surface and that the rupture had taken place into the lower cavity which contained no bowel. A drainage tube was left in for a few days. She made a good recovery.

"*Ruptured Ectopic Pregnancy.*"—A woman, aged 24 years, was admitted in an exceedingly weak state with pulse 156 and just perceptible and a history suggestive of a ruptured ectopic pregnancy. Cocaine anæsthesia followed by laparotomy confirmed the diagnosis. Ether was at once administered and the ruptured tube clamped. Her condition was so bad that the anæsthetic had to be temporarily discontinued while her abdomen and breasts were filled with saline solution. Her pulse rapidly improved, the anæsthetic was resumed and

the operation completed by ligature and excision of the affected tube. She steadily improved and never gave any further cause for anxiety.

"*Ruptured Ectopic Pregnancy.*"—This, the only fatal case of the series, occurred in a stout woman, 40 years old, admitted in an exceedingly weak condition with a greatly distended abdomen. Laparotomy was performed, the tube ligatured and removed, while the blood and clots were removed by washing out the abdomen with saline. She at first showed signs of improvement, but forty hours later succumbed apparently from heart failure as the result of a fatty heart.

"*Parovarian Cyst.*"—A woman, aged 31 years, was admitted with history of two months' amenorrhœa and a pelvic tumour. Her temperature was 101° F., and examination revealed the tumour as attached to the left broad ligament. Laparotomy under chloroform-ether anæsthesia confirmed the presence of a cystic tumour between the layers of the broad ligament and intimately adherent to intestine and abdominal wall. The sac was marsupialated and drained with complete success.

"*Parovarian Cyst.*"—A stout woman was admitted, aged 39 years, with a cystic pelvic tumour of two years' duration with much pain. She had a well-marked mitral stenosis of the heart. Under novocain anæsthesia the cyst was exposed and treated similarly to the last case; its contents were chocolate coloured. The sinus eventually healed and there has been no recurrence.

"*Ovarian Cyst.*"—A woman, aged 26 years, was admitted with an ovarian cyst which was exposed by opening the abdomen under a general anæsthesia. The cyst was multiloculated and resisted all attempts to separate it from the intestine and other structures to which it was adherent. It was therefore dealt with in a similar manner to the two previous cases with a similar result, after first breaking down the separate loculi and converting them into one common cavity.

"*Ruptured Pyosalpinx.*"—The great majority of cases of pyosalpingitis with pelvic peritonitis reacts to treatment with hot vaginal douches, ichthyol glycerine plugs, and proctoclysis in Fowler's posture. In some instances, however, this treatment fails, usually when a collection of pus ruptures into the general peritoneal cavity, and a rapidly spreading purulent general peritonitis ensues. In such cases laparotomy with drainage alone offers any means of avoiding a fatal issue. This latter course had to be adopted in eight of the cases admitted for treatment during the year.

In three cases, where the general condition of the patient justified it, salpingectomy was also performed, while in one instance, owing to the diseased condition of the uterus, hysterectomy had to be resorted to. In all the other cases laparotomy with swabbing out of the purulent material and drainage were alone justifiable, and the only two fatal cases which occurred were among these latter—one of whom succumbed from severe intestinal hæmorrhage—the post-mortem examination revealing a "hæmorrhagic septic enteritis."

E. A. TURNER, Resident Surgeon.

Colonial Medical Reports.—No. 122.—Trinidad and Tobago
(continued).**ST. ANN'S ASYLUM.**

The female admissions were much above the average and exceeded the male admissions—an unusual feature in this institution.

A larger number than usual of the admissions were in very poor physical condition. As in past years, acute mania was the most frequent form of mental disorder on admission and hereditary taint was marked. In five cases malaria was assigned as the exciting cause. In regard to the occupation of those admitted the mental breakdown appeared to be more often associated with want of fixed occupation than with any unusual stress due to war times.

The number of recoveries, though smaller than in the previous year, was not below the average of the past decennial period. The number of deaths was above the average of the past 10 years, and was due to the prevalence during the last quarter of the year of influenza and its sequelæ.

GEORGE A. VINCENT,
Medical Superintendent.

LEPER ASYLUM.

Two extra wards were opened this year. Two other wards were erected during the year and are now in use. Influenza attacked the institution at the latter part of the year and possibly many deaths were hastened thereby. There was a single case of apparent cancer—epitheliomatous in type—which was excised by Dr. Stewart and has not yet recovered.

CHARLES W. HOWATSON,
Medical Superintendent, Leper Asylum.

ST. AUGUSTINE YAWS HOSPITAL.

Sewerage.—The pail system is the one in use here and it is not very satisfactory. It is the cause of frequent annoyance and of visits by the District Officer and Deputy Surgeon-General and of considerable correspondence.

The hospital is intended to accommodate 200 patients, but owing to the indifference to the regulations for admission of cases exhibited by some of the District Medical Officers, the institution has been generally overcrowded during the year to the great inconvenience of the patients, and a strain on the equipment and staff.

Chief Diseases Treated.—The admissions in 1918 have been the highest since the institution has been opened—there were 1,299 admissions. Eleven cases proved to be lepers. Nine of these were sent to Cocorite, one absconded and one died of peritonitis following intestinal obstruction. There were 19 deaths during the year. Two are worth special attention.

A male adult, who was injected with a full dose of arsenobillon on December 17; he had convulsions on December 28, 11 days after injection, and remained in a state of coma until he died on the next morning, December 29. Death was due to Bright's disease and uræmic coma.

An East Indian woman. She was injected with diarsenol on December, 1917, and on February 28, 1918, 70 days later she took ill and remained in a state of coma until she died, four days later, on March 1, 1918. She had all the typical signs of acute meningitis. These are the only two deaths I attribute to the injections.

The percentage of admissions since the use of salvarsan is 100 per cent. greater than before.

The average yearly admissions before salvarsan was 473 and is now 974.

The daily average number in hospital before salvarsan was 194 and is now 129.

The average stay of patients in hospital, which was 166 days formerly, is now reduced to 51 days since the use of salvarsan.

The percentage of recurrences before the use of Salvarsan was 12 per cent.; it is now reduced to 5.4 per cent. The percentage among the injected cases is 4.9 per cent.

J. ALDRIC PEREZ,
D.M.O., St. Joseph.

TOBAGO YAWS HOSPITAL.

General Accommodation.—Sufficient. The total number of yaws cases treated was 436; of these, 103 were cases remaining in hospital at the end of the year 1917. At the close of the quarter ended March 31, 1918 there were 83 cases remaining in hospital; 41 for quarter ended June 30, 1918; 54 for quarter ended September 30, 1918 and 29 for quarter ended December 31, 1918.

Accommodation of Patients.—There was no overcrowding and with the use of arsenobillon injections as early as possible after admissions it would appear that the accommodation is ample. During the quarter ended March 31, 1918 a stock mixture of iodide of potassium, tartar emetic, and salicylate of soda was used; thereafter, arsenobillon injections with better results.

E. HAMEL SMITH,
D.M.O., Scarborough.

HEALTH REPORT, COLONY OF TRINIDAD AND TOBAGO FOR THE YEAR 1918.

Population.—This was estimated by the Registrar-General to be 379,165 at the middle of the year 1918. The density of population was 202 persons per square mile.

It is satisfactory to record that there was an appreciable reduction in the number of still-births during 1918 as compared with the number in 1917.

During the year there were only two districts in which the services of district nurse midwives were available, viz.: Port-of-Spain and the town of Tuna-puna in the district of Tacarigua.

It is interesting to note that the figures in these two districts were as follows, viz.:—

				Port-of-Spain	Tacarigua
1917	...	...	...	113	97
1918	..	...	...	101	69
				12	28

One hopes that there will be further reduction during the present year, and that before long all districts in the colony without exception will be amply provided with qualified district nurse midwives.

Deaths.—The total number of deaths from all causes registered in the colony was 8,228, the death-rate per 1,000 living being 21.70 as compared with 21.25 in 1917.

In all districts the birth-rates were higher than the death-rates except in Port-of-Spain and San Fernando.

The deaths in the Colonial and San Fernando hospitals show that quite a large number of persons from districts outside the town die in these hospitals, and in that way affect the mortality statistics of the towns, causing a very high crude death-rate.

Infantile Mortality.—The infantile mortality rate for the past 10 years shows a satisfactory decrease not only in Port-of-Spain but also in the entire colony.

The Baby Welfare League of Trinidad and Tobago was formed with His Excellency the Governor and Lady Chancellor as patrons. The League was given control of the Mothers' and Infants' Clinic towards the end of the year 1918.

It is the earnest hope of those who have the welfare of the League at heart, and clearly understand its objects, that a certain amount of lamentable ignorance and ill-grounded prejudice against the movement which exists among a certain number of people who are in a position to help the cause, will, in the near future, be utterly dispelled.

Enteric Fever.—This disease was very prevalent during the year.

The remarkable feature is again evident that in spite of free communication between Trinidad and Tobago enteric fever is practically unknown in the latter island, although the sanitary condition of Tobago on the whole is not up to the standard of that of Trinidad, especially Port-of-Spain. There is, as Dr. Pawan points out, some condition in Tobago connected possibly with the nature of the soil or other causes, which makes it impossible for enteric to gain a footing in that island. The absence of cases of enteric fever in Toco and Erin must also be recorded as worthy of note.

In connection with a small outbreak of enteric at Caparo, I visited the district, and found that several cases had occurred on an estate. Steps were promptly taken to disinfect the affected premises, and a few persons were immunized.

There was unusual prevalence of enteric fever in the San Juan district during the first and second quarters of the year. The cases were with few exceptions removed to the St. Joseph District Hospital for treatment. At one time there were over twenty cases of enteric fever in that institution.

Preventive Measures against Enteric Fever.—Immediately following the notification of cases, inspection and inquiry are carried out, and disinfection of premises, bedding, clothing, &c., done as soon as possible.

Fly reduction has been gradually extended in rural districts. Bye-laws dealing with the protection of foodstuffs from contamination by flies and dust have been enforced.

Protective Inoculation.—Immunization or protective inoculation has been carried out at the Health Office, Port-of-Spain, twice weekly. In country districts the usefulness of the measure was also appreciated by the people as well as medical practitioners (Government and private). The result has been that 765 persons were inoculated in various parts of the colony.

Five hundred and ten cases of pulmonary tuberculosis were notified during the year. The number of deaths was 545 and the death-rate 1.44 per 1,000, i.e., a slightly higher rate than the previous year.

Malaria.—As usual, cases of malarial fever, both benign and malignant, as well as malarial cachexia, prevailed widely throughout the various districts of the colony.

SPLEEN CENSUS, 1918.

The census was begun on September 3, 1918, and completed in all districts on December 4.

The results in the form of a summary are as follows:—

Number of children examined	...	...	20,590
" " with enlarged spleens	...	...	2,420
Percentage of children with enlarged spleens	...	...	11.2

Comparison with other Countries.—I am sorry that I have not at hand the reports of countries other than Ceylon and Mauritius for 1907-08. It would have been of great interest to compare the results with those obtained in British Guiana and Jamaica. The subjoined table shows the comparison of results:—

Name of colony	Date of census	Number of children examined	Number of enlarged spleens	Percentage
Mauritius	1907-8	31,022	10,595	34.1
Ceylon	1908	92,258	31,421	34.05
Trinidad and Tobago	1913-14	17,495	3,134	17.91
"	1914	25,927	3,658	14.109
"	1918	20,590	2,420	11.2

Anæmia was very prevalent in some districts, and with the known wide infection of the rural population with ankylostomiasis, the results which were found in the course of the taking of the spleen census may to a great extent be discarded as an indication of the degree of malaria prevalence.

This encourages one to hope that with the regular and persistent application of preventive measures against malaria in all districts of the colony, the degree of the prevalence of malaria will soon be greatly reduced.

The colony was affected by the pandemic of influenza during the last three months of the year. There were 46 deaths from influenza registered during the year, 41 being in the last quarter.

COMPARATIVE STATEMENT.

Spleen Census.—(1) September 1913 to March, 1914. (2) September 14, 1914, to October 15, 1914. (3) September 3, 1918, to December 4, 1918.

No.	Medical District	1913-14		1914		1918		Increase (+), or decrease (-), for the year 1918 as compared with 1913-14
		Number of children examined	Percentage of enlarged spleens	Number of children examined	Percentage of enlarged spleens	Number of children examined	Percentage of enlarged spleens	
1	Mayaro	367	60.76	429	56.41	545	70.20	+ 9.44
2	Arima	1,075	7.906	920	1.09	900	44.20	+ 36.294
3	Guaracara	1,108	14.35	961	5.52	226	37.00	+ 22.65
4	Erin Guapo	165	43.03	176	53.41	550	33.00	- 10.03
5	Scarborough (Tobago)	1,078	14.37	1,055	11.47	814	30.20	+ 15.83
6	Cedros	724	35.77	530	35.09	516	29.80	- 5.97
7	Plymouth (Tobago)	1,000	4.30	991	12.51	313	25.30	+ 21.50
8	Oropuche and La Brea	361	46.81	588	57.65	306	24.80	- 22.01
9	Couva	1,181	16.51	1,048	9.16	1,114	15.90	- .61
10	St. Joseph	612	.65	1,096	16.24	1,276	13.30	+ 12.65
11	Bocas—Diego Martin	286	5.67	344	44.77	1,997	10.50	- 75.17
12	Chaguanas	2,188	29.107	1,262	20.36	765	6.70	- 21.407
13	Tacarigua	1,521	.54	2,053	2.48	1,664	5.70	+ 5.16
14	Princes Town and North Naparima	1,104	.18	1,078	3.34	485	5.50	+ 5.32
15	Naparima South and San Fernando	626	23.96	657	17.96	2,023	5.50	- 18.46
16	Gran Couva	246	7.31	652	5.83	400	5.20	- 2.11
17	Toco	—	—	881	16.57	734	5.10	- 11.47
18	Roxborough (Tobago)	893	28.06	1,021	36.92	990	.20	- 27.86
19	Port-of-Spain	—	—	5,035	1.29	4,972	.10	- 1.19
20	Manzanilla	—	—	1,311	2.52	—	—	—
21	Indian Walk	1,271	10.38	980	6.33	—	—	—
22	Rock River	371	27.76	397	32.75	—	—	—
Total whole colony		17,495	17.91	25,927	14.109	20,590	11.20	= 6.71

PUBLIC HEALTH ADMINISTRATION.

The year 1918 saw a further advance in the establishment of health administration based on the new Public Health Ordinance 1915, which came into force on January 1, 1917.

The Central Board of Health held four meetings, at which important business was transacted, and bye-laws and regulations were approved.

The reports of two important committees were adopted, viz.: one dealing with the question of the establishment of markets in populous centres in country districts, and the other with the subject of latrine accommodation in rural districts.

(a) *Bye-laws.*—In addition to those approved by the Central Board of Health during 1917, bye-laws were considered and approved relating to the following:—

(i) In urban districts: 1. Soap boiling; 2. Tanning; 3. Barracks and barrack yards, and sale of milk.

(ii) In rural districts: house refuse; sale of milk; shops, &c.

(b) *Regulations* were made by the Central Board of Health with regard to yellow fever.

The provision of sanitary conveniences in country districts were kept prominently in view during the year, and local authorities were asked to redouble their efforts to ensure that every dwelling in every village and in every estate should in a short time be provided with proper sanitary privies. There has been a certain amount of improvement effected.

On March 1, 1918, I recommended that the Vaccination Ordinance which legalizes the objectionable procedure of arm to arm vaccination should be

repealed. An amending Ordinance was drafted, but was not passed during 1918.

The oiling of all the streets in Port-of-Spain and many of the country roads, especially in and near to villages, has reduced the dust nuisance considerably. The application of an oil floor dressing has also been extensively adopted in many Government offices, schools, stores, hospitals, &c. The effect of the liberal use of oil in these ways must exert a beneficial effect on health conditions.

House Refuse.—In the course of the year 1917, I visited nearly every village of importance in the colony, and was particularly struck with the unclean and insanitary condition of the streets and drains in most of them, produced by the dumping and scattering of rubbish.

In January, 1918, it was suggested that bye-laws similar to those in force in urban districts should be applied to certain villages. The bye-laws were made on April 15, 1918.

The quarterly reports on the sanitary condition of elementary schools are forwarded to the Inspector of Schools who has power to enforce sanitary improvements.

DIGEST OF ANNUAL REPORTS.

Indian Walk District.—During the last quarter two cases of enteric fever were notified. Malaria and ankylostomiasis were the two most prevalent diseases. Hearty co-operation of large employers of labour is essential in any attempt to stamp out ankylostomiasis. Some of the largest estates have no latrine accommodation for their labourers.

Chaguanas District.—The endemic diseases pre-

valent were malaria and ankylostomiasis. The Sanitary Inspector did some good educational work with reference to these two diseases.

Water supply is unsatisfactory.

Fourteen cases of enteric fever and two of pulmonary tuberculosis were notified and premises were disinfected.

Mayaro District.—Health of district was fair. There were two cases of blackwater fever, one being fatal.

Principal diseases were malaria, chronic rheumatism, &c.

General sanitary improvement of yards was effected. Special anti-malarial work, e.g., filling up and draining ponds and oiling water collections was carried out by a gang under a trained Sanitary Inspector.

Water supply—not satisfactory.

Guaracara District.—Malaria prevailed in July, October, November and December. Dysentery and diarrhoea in January, March and July. Ground itch in January, February, July, November and December.

The large population living along the banks of the Guaracara river depend on it for their regular supply of drinking water, which is naturally polluted by drainage from yards and closets on the banks. The following subjects are dealt with, viz.: Duties of Sanitary Inspector, measures for controlling the milk supply and the sale of food, the insufficient and impure water supply, drainage of estates and yards, the provision of latrines, and disposal of house refuse.

Couva District.—The general health condition was normal. There was no epidemics. Twenty-one cases of enteric fever were met with and usual precautionary measures adopted.

The condition of the water and milk supply is unsatisfactory. Regular and special visits were paid by the Sanitary Inspector. Scavenging is regularly done.

Tacarigua District.—The water supply of Arouca, Tacarigua, and Eldorado is unsafe. The drains along the Eastern Main Road are in a bad state. Typhoid fever and pulmonary tuberculosis were the only infectious diseases notified during the year.

Many cases of influenza of a mild type occurred during the latter half of the year.

With regard to the milk supply, the principal unwholesome conditions are referred to, and considerable improvement is expected in the application of the new sale of milk bye-laws, so also with regard to the bye-laws affecting the sale of food, cakes, &c.

Drainage and sewage arrangements of the districts are unsatisfactory. In the village of Tunapuna very few houses are without privy accommodation. In the smaller villages, however, there are very many premises without privy accommodation.

House refuse is removed by a scavenging cart in Tunapuna. The new bye-laws will ensure the provision of proper receptacles for the collection of rubbish. In other villages rubbish is disposed of by being thrown on adjoining fields.

Arima District.—There was a large increase in cases of typhoid fever during the year, 194 cases being notified. Malignant malarial fever was unusually prevalent especially in the Cumuto district.

Towards the end of the year there were a few slight

cases of influenza. Dysentery was less prevalent than usual. The usual precautions were adopted in all cases of typhoid fever and tuberculosis.

Dairies and bakehouses were duly inspected and kept clean and sanitary.

Toco District.—The sanitary condition of the district is improving.

Malaria is still the most prevalent disease. Anti-malarial and general sanitation work under a trained Sanitary Inspector was carried out. Unsound food was condemned on three occasions. Water supply is inadequate. Privy accommodation is being improved.

Cedros District.—Malaria is by far the most prevalent disease. Dysentery and typhoid are still prevalent and will continue until the water supply (one of the greatest needs of the district) is improved. In the month of October mild cases of influenza but no deaths occurred.

Sanitation was improved in two directions: first a provision of latrines, and secondly, removal of rubbish from premises and the consequent improvement in the cleanliness of yards.

Anti-malarial work was carried out to a minor extent, and the breeding grounds of anopheles in the neighbourhood of the principal villages have been reduced.

Gran Couva District.—The general health of the district has been about the average. There were five cases of enteric fever and two deaths. There were 18 deaths from malaria and five from dysentery.

Sanitary inspection has been carried out by Ward Officers who were not trained.

Water supply from springs and wells.

Privy accommodation is limited. House refuse usually accumulates on premises.

There is no systematic drainage and sewage disposal.

Erin-Guapo District.—Malarial fever was prevalent during the rainy season, especially during August and September.

Dysentery—a few cases at beginning of rainy season.

Typhoid fever—only one case during the year. It was impossible to trace the source of infection. Towards the end of the year mild cases of influenza were observed.

Minor anti-malarial measures, e.g., draining, weeding, oiling, &c., were carried out. General sanitary improvement in the villages was carried out, especially in the Point Fortin area.

Water supply from springs, Erin river, tanks, barrels and large Government cisterns in Erin village.

Privy accommodation is not satisfactory, and is absent in many cases. The pail system is in use at Point Fortin, on the property of the United British Oilfields Company.

Scavenging has been done in the principal villages.

South Naparima District.—Enteric fever was not as prevalent as in 1917.

Influenza was very prevalent in September and October.

Ankylostomiasis is still keeping a high record of infection, but treatment is more sought after voluntarily than in previous years.

Colonial Medical Reports.—No. 123.—Jamaica.

ANNUAL REPORT OF THE SUPERINTENDING MEDICAL OFFICER FOR THE YEAR ENDED MARCH 31, 1919.

By **LAWSON GIFFORD,***Acting Superintending Medical Officer.*

INFECTIVE DISEASES.

EMBRACED under this head, I submit a few remarks with respect to enteric fever, malaria, yaws, tuberculosis, ankylostomiasis and venereal diseases.

Enteric Fever is still endemic in Kingston. It is essentially a filth disease, and will naturally become less as sanitation advances. The extension of the water carriage system of sewage disposal which is the great desideratum in this connection is now engaging the attention of the authorities, and the several parochial boards are being urged to look to the general sanitation of their district. Inoculation as a prophylactic measure is being gradually introduced, its beneficial effects becoming more and more recognized by the community.

Malaria.—This disease was fairly prevalent throughout the year. Dr. Grabham, in his report on Kingston, states that the anopheline mosquito is as common as ever to the east of the city. The question of the filling up of swamps in the neighbourhood of thickly populated centres in Jamaica will have to be taken up and dealt with systematically, if a serious attempt is to be made to eradicate this disease. Quinine was regularly sold at cheap rates at the post offices throughout the year, except for a short time during the latter part of 1918, when the supply ran short. This is, however, only a subsidiary measure, and can in no way be regarded as a substitution for the efforts to exterminate the mosquito.

The Malaria Commission, which did good work in the past and which became defunct some years ago, should be resuscitated.

Yaws.—This is a disease that responds readily to treatment by salvarsan and its derivatives, but the methods of attacking the disease will have to give place to a more regular and systematic campaign. The people come out readily for attention and do not resort to concealment.

Tuberculosis.—Pulmonary tuberculosis showed rather an increase during the year. A large number of cases supervened on an attack of influenza, and some medical officers are of opinion that they were simply latent cases rendered active by acute disease. Some cases are attributed to lowered vitality and resistance due to influenza exposing the patient to easy attack by the tubercle bacillus. This brings one to speak of the terrible amount of overcrowding which exists throughout the island, and which is such a liberal contributor to the causation of pulmonary phthisis. Almost every district medical officer makes pointed allusion to

this unsatisfactory feature of public life. The whole question of housing in Jamaica is one that calls loudly for attention, a call which ought not to be allowed long to fall on deaf ears.

Ankylostomiasis or Hookworm Disease.—Following up the visit to Jamaica of Dr. H. H. Howard, Director of the International Health Board or Rockefeller Foundation, Dr. M. E. Conner of the same Foundation arrived in the island early in the year to make a preliminary survey as regards the extent of hookworm infection in the population. It was intended that soon after, treatment in the shape of a demonstration campaign should commence. Due, however, to war conditions and other unavoidable delays, the medical officer in charge of the campaign only reached here on February 24. Meantime a superintending inspector had been appointed to see to the carrying out of the necessary antecedent sanitary measures, but in consequence of the general apathy in sanitary matters the preliminary work was not sufficiently advanced to permit of operations in the island. The work, however, is now being carried out with more energy.

Venereal Diseases.—Of the many medical problems that confront Jamaica at the present time, the one touching these diseases is by far the most knotty. Apart from the affection itself, there is the moral question which appears to some to be inseparably bound up with the medical side. Personally, I think the two should be kept separate and apart. Another troublesome feature is the tendency to secrecy and concealment. The district medical officers almost unanimously refer to the prevalence of venereal diseases.

Influenza.—The widespread pandemic of influenza reached Jamaica in October, 1918. It began at the north coast of the island, in Port Antonio and Montego Bay, probably introduced from one or other of the North American ports, and spread rapidly inland, reaching Kingston in November, by which time it had the whole island in its grip. The number of persons attacked was approximately 70,000, with about 3,641 deaths. The principal complication, which also was the chief cause of the fatalities, was bronchopneumonia of a septic type. It was noted that the disease was most severe and fatal in young strong male adults. The disease disappeared almost as rapidly and promptly as it had appeared after it had done its fell work. It, however, left its mark on the vital statistics of the colony.

Ackee Poisoning.—The remarks of Dr. H. H.

RETURN OF DISEASES AND DEATHS IN 1918-19 IN THE PUBLIC HOSPITAL, KINGSTON,

Jamaica.

GENERAL DISEASES.

	Admis- sions	Deaths	Total Cases Treated
Alcoholism	3	—	3
Anæmia	26	3	26
Anthrax	—	—	—
Beriberi	1	—	1
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	2	1	2
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	—	—	—
Diabetes Insipidus	—	—	—
Diphtheria	14	7	14
Dysentery	49	10	49
Enteric Fever	230	52	230
Erysipelas	1	—	1
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	229	2	229
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	316	49	316
Kala-Azar	—	—	—
Leprosy	—	—	—
(a) Nodular	—	—	—
(b) Anæsthetic	—	—	—
(c) Mixed	—	—	—
Malarial Fever—	6	1	6
(a) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	173	12	173
Quartan	1	—	1
Irregular	—	—	—
Type undiagnosed	—	—	—
(b) Remittent	—	—	—
(c) Pernicious	—	—	—
(d) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	3	—	3
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	29	3	29
Malignant	26	4	26
Old Age	—	—	—
Other Diseases	435	61	435
Pellagra	3	2	3
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	33	—	33
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	7	6	7
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(a) Primary	132	7	132
(b) Secondary	13	—	13
(c) Tertiary	5	1	5
(d) Congenital	20	14	20
Tetanus	5	3	5
Trypanosoma Fever	—	—	—
Tubercle—	—	—	—
(a) Phthisis Pulmonalis	66	21	66
(b) Tuberculosis of Glands	—	—	—
(c) Lupus	—	—	—

GENERAL DISEASES—continued.

(d) Tabes Mesenterica	—	—	—
(e) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	—	—	—
Yaws	11	—	11
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the—			
Cellular Tissue	147	7	147
Circulatory System	75	29	75
(a) Valvular Disease of Heart	—	—	—
(b) Other Diseases	—	—	—
Digestive System—	361	50	361
(a) Diarrhœa	—	—	—
(b) Hill Diarrhœa	—	—	—
(c) Hepatitis	—	—	—
Congestion of Liver	—	—	—
(d) Abscess of Liver	—	—	—
(e) Tropical Liver	—	—	—
(f) Jaundice, Catarrhal	—	—	—
(g) Cirrhosis of Liver	—	—	—
(h) Acute Yellow Atrophy	—	—	—
(i) Sprue	—	—	—
(j) Other Diseases	—	—	—
Ear	2	—	2
Eye	60	1	60
Generative System—	—	—	—
Male Organs	85	2	85
Female Organs	160	3	160
Lymphatic System	86	8	86
Mental Diseases	62	29	62
Nervous System	49	1	49
Nose	6	—	6
Organs of Locomotion	—	—	—
Respiratory System	104	17	104
Skin—	176	6	176
(a) Scabies	—	—	—
(b) Ringworm	—	—	—
(c) Tinea Imbricata	—	—	—
(d) Favus	—	—	—
(e) Eczema	—	—	—
(f) Other Diseases	—	—	—
Urinary System	93	34	93
Injuries, General, Local—	219	10	219
(a) Siriasis (Heatstroke)	—	—	—
(b) Sunstroke (Heat Prostration)	—	—	—
(c) Other Injuries	—	—	—
Parasites—	42	1	42
Ascaris lumbricoides	—	—	—
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duo- denale	—	—	—
Filaria medinensis (Guinea-worm)	—	—	—
Tape-worm	—	—	—
Poisons—	9	5	9
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	—	—	—
Amputations, Major	—	—	—
" Minor	500	—	500
Other Operations	—	—	—
Eye	—	—	—
(a) Cataract	—	—	—
(b) Iridectomy	—	—	—
(c) Other Eye Operations	—	—	—

Scott on the subject of ackee poisoning are of great interest. The conclusion he arrives at is that the "so-called vomiting sickness," between which and ackee poisoning there is some confusion, is in nine cases out of ten nothing more nor less than ackee poisoning pure and simple, and that the few remaining cases are due to distinct ascertainable pathological conditions. In other words, that there is no such disease entity as vomiting sickness, and that, consequently, the term may be eliminated from our vocabulary of diseases.

In this connection I cannot refrain from alluding to a matter which seems not without a touch of humour. As a result of the dangerous nature of the ackee, and in view of the several fatalities, the question was at one time mooted as to whether the ackee trees had better not be cut down. Dr. Grabham, on the other hand, naively suggests in his report that the tree might be cultivated as a source of revenue. One is almost tempted to ask—Is this a case of "doctors differing and patients dying?"

Registration of Deaths.—The point that strikes one in this connection, and which is from time to time referred to by the Registrar-General, is the large proportion of deaths that are not medically certified. During the calendar year 1918 the proportion of those medically and non-medically certified was 8,012 to 21,568. After making due allowance for the ignorance and superstition of the people, it is beyond question that the medical profession is not reaching the bulk of the people, and is another patent reason for the reorganization of the medical department in order to bring medical aid within the reach of those of limited means.

The Child Saving League.—The subject of the preservation of child life is one of the most important medico-social questions of the day, and one that seems to be claiming attention in all civilized countries. The wastage of life during the first few months after birth, not to speak of ante-natal losses, is enormous, and every agency having for its object the checking of this waste is worthy of every encouragement. It is to be hoped that the modest annual grant in aid will, when financial circumstances allow, not only be augmented but extended, and that this aid will not be confined to Kingston alone.

In this connection a word of praise may be awarded to the work of the benevolent ladies who have organized and are operating the creche in Kingston, and which is showing a marked and gratifying effect on infantile mortality in this city. The district nurses, too, by their visits to the sick in the poor parts of Kingston, have relieved much suffering and restored many a one to health and usefulness.

General Sanitation.—Little or nothing in the way of improved, up-to-date sanitation was effected during the year. This is most disappointing. If Jamaica is to maintain a respectable position alongside of her sister colonies and neighbouring countries, it will have to be seen to that the existing

laissez faire policy gives place to one more in consonance with the progressive spirit of the age. The preliminary steps now being taken in the hookworm campaign have brought sanitary defects, known before, even more prominently to notice, and it is to be hoped that the Health Boards in the various parishes will see the urgent necessity to be up and doing. A step in aid of this movement, and one that is fraught with great potentialities in sanitary matter, has been taken by the Central Government by the appointment of a superintending inspector. This officer is capable by energy and well directed efforts to work something of a revolution in the sanitary affairs of the colony. The cry of want of funds must not be allowed to deaden enterprise in an important subject of public health.

Medical Attendance.—The medical system of the colony which was instituted half a century ago requires to be reorganized and brought up to modern requirements. It is not doing for the poorer classes what it could and should do. I have not a word to say against the medical officers who, as a rule, are men of ability, energy, probity and humanity. But it is the system that is open to question. Some arrangement will have to be made whereby the resources of the department are made more easily and cheaply available to the poor. At present the usual fee for consultation and medicine is 4s., and under what is called the ticket system there is a fee varying from 1s. to 3s., exclusive of travelling expenses. There is a large class of people in Jamaica who, while not actual paupers, earn by their labour just enough to eke out a hand to mouth existence. As soon as they become ill they have nothing, not even enough to procure nourishment, much less to pay the doctor. These people trade on the humane feelings of the doctor and exploit him. This is not fair to a set of professional men whose salaries or subsidies or whatever they may be termed do not err on the side of liberality. It seems to me that the time has arrived when one or other of two possible alternatives will have to be considered and adopted, either to pay full salaries to the medical officers and regard them as whole-time public servants, or start a scheme somewhat akin to the panel system which is being worked in England under the National Insurance Act. The first of these alternatives will be very expensive. The second is preferable, as it seems to me, because, apart from making a less strain on the Treasury, it engenders and fosters the spirit of co-operation and independence and does away with anything like an eleemosynary feature. This could apply to the labouring classes, who, as well as their employers, would be called upon to make a regular weekly contribution to the fund to be operated by the Panel Committee, a body appointed for the purpose.

Few new works were carried out during the year, not from absence of necessity, but from lack of funds.

CENTRAL BOARD OF HEALTH REPORT FOR THE YEAR
ENDED MAY 31, 1919.

The year under review was not marked by unusual prevalence of epidemic disease, excepting that of Spanish influenza, which appeared during the period October to December, 1918.

The presence of dysentery in St. Ann was reported on August 5, 1918, and the Board recommended to the Governor that the Local Board of Health should be called upon under section 17 of Law 35 of 1910 to take steps for arresting the spread of the disease. In this connection dysentery was on September 19, 1918, declared to be a notifiable disease in the parish for a period of three months.

There were slight outbreaks of malarial fever in Hanover and of dysentery and whooping-cough in St. Andrew, but their progress was arrested, and in neither case did they assume large proportions.

The prevalence of trachoma in the schools in St. Thomas was reported by the Parochial Board, and, on the recommendation of the Central Board of Health, the Local Board of Health were called upon by the Governor to take the action required by section 17 of Law 35 of 1910.

As recorded in last year's report, the question of anti-typhoid inoculation for the purpose of immunizing the population as far as is practicable, especially in connection with schools and other public institutions suggested by the Mayor and Council of Kingston, has been under consideration by the Board. The Parochial Boards have been asked to co-operate in the matter.

As in former years numerous complaints were received from residents in the several parishes of the existence of insanitary features in close proximity to their residences and to conditions which it is alleged menaced public health. In every case the representation was transmitted to the Parochial Board concerned, with the request that attention be given to the matter by their Sanitary Department. In all cases the Parochial Boards took necessary action for remedying of the nuisance where it was found to exist.

In view of the necessity for the proper training of sanitary inspectors employed to the several parishes, the Board have under consideration a scheme whereby officers could obtain instructions in modern sanitary science, resulting in benefit alike to the officers and to the public.

The death in the United States of America on October 25, 1918, of Dr. J. E. Ker, Superintending Medical Officer and Chairman of the Board, is recorded with deep regret, accentuated by the fact that his demise occurred so far removed from the scene of his labours. For a period of fourteen years the late Dr. Ker manifested the keenest interest in the work of the Board, and to his tireless energy and many months of hard work is to be credited the passing of Law 35 of 1910, which is the mainspring of the machinery connected with the sanitary work of the colony.

During the year under review the Midwifery Bill was introduced into the Legislative Council.

Monthly examinations of water were made for the Kingston General Commissioners at the Bacteriological Laboratory, also examinations at the requests of medical officers of health for St. Andrew, Hanover, Westmoreland, Manchester, St. Catherine.

HOOKWORM.

The year under review marks an era in sanitary work due to the advent in the island of a representative of the Rockefeller Foundation, charged with the duty of eradicating hookworm.

This charitable organization, which has been doing work in connection with the eradication of disease in other British colonies, was invited to include Jamaica in its operations. The scheme originated in 1914, and was worked on until 1918, when Dr. Conner, a representative of the Foundation, visited Jamaica for the purpose of making a survey and obtaining information in connection with the proposed operations. As a result of his visit it was decided that Jamaica should be included in their field of labour, and the details of the scheme were definitely settled by the Government and the Foundation.

Considerable data as to the prevalence of the disease in the island were obtained by Dr. Conner, and in this the Parochial Boards played an important part in facilitating the preliminary investigations.

The final stage was arrived at in a message to the Hon. Legislative Council from the Governor on May 9, 1918, in which Sir W. H. Manning outlined the details of the scheme and showed the parts to be played respectively by the Government of Jamaica and the Rockefeller Foundation.

The Rockefeller Foundation agreed to defray the cost of survey wherever made and to provide the staff necessary for treating the disease, whether the members thereof be medical practitioners, nurses, orderlies, microscopists, clerks or otherwise. On the other hand, the Government of Jamaica were required to provide funds for the appointment of a superintending inspector and sanitary inspectors and for the necessary drugs and stationery and incidental expenses.

The proposals were approved by the Legislative Council, and a sum of £2,000 placed on the estimates for the purpose. It was clearly laid down by the Rockefeller Foundation that the treatment of hookworm would only be started on the institution of a proper and sanitary latrine system. Such a system could not be said to exist throughout the island generally, and it was necessary for it to be installed before any satisfactory results could be expected from medical treatment. It was regarded by the Foundation that, as long as free and unchecked pollution of the soil existed, there could be no hope for the arresting of the development of the hookworm.

Colonial Medical Reports.—No. 123.—Jamaica (continued).

It was also laid down by the Foundation that the work of the treatment and cure in the demonstration campaign does not commit them to further work, unless in their opinion conditions are favourable and unless they receive full co-operation.

The Central Board of Health charged with the duty of enforcing the sanitary conditions started to prepare the ground for the arrival of the Foundation's representative. The superintending inspector was directed to start measures for the provision of the necessary latrine system, and the sanitary officers under his control were appointed. The Parish of Clarendon was selected as the one in which operations should commence. The Local Board of Health was requested to take early steps to carry out the duties imposed on them by law, that of providing proper latrine accommodation, thus abolishing free and unchecked pollution, a condition which would render abortive the efforts made at treatment. The Government are adopting the most energetic measures to carry out this part of the contract, and it is hoped that the Local Boards of Health, recognizing the lasting benefits that must accrue from the eradication of hookworm, will for their part do everything that is required of them. Only in such event will the Rockefeller Foundation continue their operations in Jamaica.

On February 24, 1919, Dr. P. B. Gardner arrived in the colony as the representative of the Foundation charged with conducting the operations in Jamaica. He and his staff are now quartered at May Pen in the parish of Clarendon, and the campaign for the treatment of hookworm is in full operation. Dr. Gardner, who possesses much energy and a most desirable personality, is eminently fitted for the position of representative of the Foundation, a position at times requiring the exercise of patience and tact.

INFLUENZA.

October, 1918, to December, 1918.

During the month of October, 1918, Spanish influenza made its appearance in the parish of Portland and then in St. James. The disease rapidly spread, and during the period of October to December the whole island was in its grip.

The Central Board of Health, with the approval of the Governor, instructed the superintending inspector who was appointed in connection with the hookworm campaign to visit the several parishes, and to report on the steps being taken to arrest the spread of the disease and to report on the measures to be taken for its suppression.

Leaflets were printed and issued to Parochial Boards for distribution as to the measures to be taken for the prevention of Spanish influenza, and it was suggested also that the wearing of masks would be a desirable prophylactic measure. A copy of the suggestions follows:—

PREVENTION OF SPANISH INFLUENZA.

(1) The disease is an acute infective disorder characterized by: (a) Sudden onset, the patient feeling weak, prostrated and unfit for work; (b) fever, headache, backache and pains in the limbs—generally with a dry cough; (c) a little later there is a marked cough with expectoration, discharge from the nostrils and running from the eyes; (d) sometimes there is sore throat. The disease may start with vomiting and stomach disorders or diarrhoea, and may resemble an acute bilious attack.

(2) The patient should at once go to bed and medical advice should be sought. Meantime the patient should be kept warm and given a simple nutritious diet of milk and strong beef tea. Moderate doses of alcohol (whisky or rum) may be given if signs of weakness appear. The bowels should be cleared out with small repeated doses of calomel (say $\frac{1}{2}$ gr. every hour until six doses have been taken), then a dose of Epsom salts, say $\frac{1}{4}$ to $\frac{1}{2}$ oz. (for children smaller doses of course to be given). Where pain is severe, aspirin in 5-gr. doses three times a day.

(3) *Isolation.*—The patient should be kept in a cool, well-ventilated room, and kept strictly isolated from everyone except those in actual attendance on him.

(4) *Disinfection.*—All clothing (bed and body) used by the sick, handkerchiefs, &c., should be boiled.

(5) *Segregation of the Sick from the Healthy.*—Children should not be sent to school from infected homes. All persons from such infected homes should keep away from places where crowds congregate, such as churches, markets, court-houses, places of amusement, &c.

(6) *Preventive Measures.*—(a) A daily dose of quinine as a prophylactic, 5 gr. for an adult, for children in proportion; (b) spitting on the streets of towns, on railway carriages, trams and all public places to be carefully avoided; (c) in all cases of sneezing a handkerchief should invariably be held before the face; (d) a gargle of permanganate of potash (Condy's fluid) or peroxide of hydrogen or dioxygen or ordinary table salt should be used frequently daily—the nostrils should also be washed out with one of these preparations; (e) all public offices, stores, shops, &c., should be daily washed out with a strong disinfectant, such as Jeyes' fluid or formaldehyde (1 oz.—2 gallons of water), especially before the process of sweeping the floors is commenced.

LAWSON GIFFORD,

Acting Chairman Central Board of Health.

Dr Crosswell, Superintending Inspector, visited all the parishes in the island, and co-operated with the local sanitary authorities. From his reports it is shown that the most serious complication was pneumonia of a very severe type with great prostration and high mortality.

The Central Board of Health suggested that certain precautionary measures be taken to prevent the spread of the disease, such as fumigation of railway carriages; restriction on the issue of tickets on the railway at any station beyond Ipswich on the Montego Bay line and beyond Annotto Bay on the Port Antonio line. Suspension of the mail coach service from the affected parishes and also from such other points as are likely to furnish infection; closing of picture palaces and other places of public resort where crowds gather, so as to avoid the spread of infection.

M. C. SOLOMON,
Secretary, Central Board of Health.

KINGSTON LUNATIC ASYLUM.

The following questions and answers may be of interest to our readers:—

Q. What is the source of the water supply; the quality of the water; and the amount of water available for each patient every day?—A. The Hope River, Government Water Works, recently augmented by additions from the Ferry River. By analysis variable. The amount of water available per head is limited.

Q. What is the number of (i) Lavatories? (ii) Baths? (iii) Latrines?—A. (i) Every ward is provided with a lavatory. Day is begun by general bathing. In special cases and for sick and helpless, hand basins and zinc baths are provided. (ii) Fresh water shower baths are provided in all the wards, and there is a sea-bath. (iii) Self-flushing water-closets connected to the Kingston system of sewerage have been installed in the place of the earth-bucket latrines, except in the cases of the quarters of the senior and junior assistant medical officers, the chief clerk and the mortuary.

Q. What is the system of sewerage?—A. As above. Open gutters and a short length of sewer carry foul and storm waters into the harbour.

Q. By whose authority patients are restrained?—A. The medical officers only.

Q. What kinds of mechanical restraint are in use?—A. Canvas camisoles with sleeves stitched to the sides.

Q. Whether any, and, if any, how many, cases of cruelty by attendants to patients have been brought to the notice of the proper authority, and what was the result of each case?—A. Nil.

Q. What was the number of cases of injury to patients (i) By themselves? (ii) By other patients. (iii) By attendants?—A. (i) 55. (ii) 134. (iii) Nil.

OCCUPATION.

The extent of the airing court, 12 acres, and other grounds, 109 acres 9 rods, belonging to the asylum.

Q. Are the patients, as a rule, given daily exercise, their health permitting?—A. Yes; they live in the open air; are given walks on the grounds.

Q. Are they confined to airing courts, or allowed to walk in other grounds, and sent beyond the asylum?—A. Allowed exercise in the asylum grounds beyond the airing courts as much as possible.

Q. Are any means taken to amuse the patients or to induce them to amuse themselves? Detail them.—A. Newspapers, periodicals, or books which have been presented to the asylum library and books purchased out of the Patients' Fund, Bibles, Testaments, Hymn and Prayer Books are also distributed. Pipes and tobacco are given as indulgences, and fruits when in season. Occasionally music and variety entertainments form part of the amusement of the patients, as do "sports" in the grounds.

Q. How many religious services were held in 1918-1919?—A. Fifty-two on Sundays, one on Christmas Day, and one on Good Friday. There is also an afternoon service for men each Sunday in the cricket pavilion.

Q. What was the average attendance?—A. Males, 130; females, 120.

Q. In what building, and how many could it contain?—A. There is no chapel; at present service is conducted in the Amusement Hall, the only available part of the institution.

ORDINARY DIET.

Ordinary B—Breakfast: 1 pint of milk, substituted for hominy, 4 oz.

Ordinary C—Breakfast: 1 pint of coffee, substituted for hominy, and made of $\frac{3}{4}$ oz. ground coffee, 1 $\frac{1}{4}$ oz. sugar, $\frac{3}{4}$ oz. milk.

Ordinary D—Breakfast: 1 pint of ginger tea, substituted for hominy, and made of ginger, sufficient quantity, 1 $\frac{3}{4}$ oz. sugar.

The hominy is made of 2 oz. of cornmeal to the pint. Peppers are supplied regularly, together with scallions, flour, lard and other seasonings. Limes, salt, black pepper and vinegar are supplied as required.

Mondays and Fridays are soup days—one pint to every patient.

Mangoes, oranges, pears and other fruits are liberally supplied when in season. Breadfruits, cocoas, sweet and Irish potatoes and bananas are substituted for yams at dinner and fresh fish for salted.

SICK DIETARY.

Unfixed and unrestricted as the occasion or case may require.

Colonial Medical Reports.—No. 124.—St. Vincent.
REPORT FOR THE YEAR 1918-19.
By CYRIL H. DURRANT, M.B.,

Colonial Surgeon.

KINGSTOWN, ST. VINCENT,
June, 1919.

VITAL STATISTICS.

THE Registrar-General's return shows that the estimated population of the colony at March 31, 1919, was 51,190.

The total number of births was 1,795. Males, 951; females, 844.

Stillbirths numbered 111.

The birth-rate was 35.06 per thousand.

The total number of deaths was 1,102, excluding stillbirths.

The death-rate was 21.7.

REMARKS ON PARTICULAR DISEASES.

Epidemic Influenza.—This pandemic made its appearance in this colony at the end of December, 1918; it reached its highest point in January, and gradually subsided in February. 1,121 cases were recorded with seventy-six deaths. Every clinical type of the disease was met with, and a "transitory mania" was recorded in several of the cases admitted to hospital.

Pneumonia and broncho-pneumonia were frequent and common complications.

Typhoid Fever.—This disease has persisted throughout the year in the Mt. Young Village, a small village situated at the southern end of Georgetown in the No. 5 District. The medical officer's opinion that the infection arises from the drinking water, which is taken from the Grand Sable stream and is fouled with night soil, is probably the correct one.

There have been eighteen cases with eight deaths.

Strict sanitary precautions have been taken to clean up the village; posters, put up with advice as to prevention, and sanitary latrines erected under the supervision of a sanitary inspector.

Inoculation of contacts with anti-typhoid serum proved useless on account of refusal to submit to injection.

Malaria.—This disease has been less prevalent than in the preceding years, 352 cases with seven deaths being recorded as against 512 cases with six deaths in 1917-18.

No special anti-malarial work is recorded.

The district medical officers all draw attention to the prevalence of yaws, infantile diarrhoea and syphilis.

Pulmonary tubercle still claims its steady toll of victims, 147 cases with sixty-six deaths being recorded as against 202 cases with fifty-nine deaths in 1917-18.

ANKYLOSTOMIASIS (HOOKWORM DISEASE).

The campaign against this disease, operated with funds provided by the International Health Board, carried on its work from May 10 to August 26, 1918. During this period the village of Lowmans on the leeward coast was worked. The following table shows the work accomplished during that period:—

Number of persons censured	...	...	...	1,121
" " microscopically examined	...	...	...	1,117
" " infected	...	...	...	955
" " treated	...	...	...	884
" " cured	...	...	...	766

I append the following report of the work done by the ankylostomiasis campaign in the colony from May 1, 1915, to August 26, 1918, when the work was closed down. Measures for the eradication of ankylostomiasis in St. Vincent began on May 1, 1915, with Dr. W. P. Jacocks as Medical Officer in Charge. On November 14, 1915, Dr. P. B. Gardner succeeded Dr. W. P. Jacocks as Medical Officer in Charge, and the work has continued under his direction up to August 26, 1918. With the exception of the period December 9, 1917, to May 9, 1918, when the medical officer in charge was absent on leave, the work has continued without interruption.

Up to December 9, 1917, the operations had covered the entire windward coast of the island from a point just outside the town of Kingstown to the northern extremity of the island. During 1918 one district just outside the town of Kingstown on the leeward coast has been worked. In practically all of this work the intensive plan of work has been followed. This intensive plan requires that each home in the territory covered be visited by a member of the staff, who takes a complete census of every person living in this territory, obtains a specimen for examination from as many as possible of the people included in the census, and treats as many as possible of the people who are found to be infected until a cure has been effected.

For convenience, the territory covered during this period was divided into ten smaller districts, each one of which was worked separately. The Field Office was located in each of these districts, and from this point the work was conducted. Each district was further subdivided into smaller areas, so that each nurse had a definite area in which to work, and each nurse was held responsible for the work in his small area.

RETURN OF DISEASES AND DEATHS IN 1918-19 IN THE COLONIAL HOSPITAL,

St. Vincent.

GENERAL DISEASES.

	Admis- sions	Deaths	Total Cases Treated
Alcoholism	1	—	1
Anæmia	—	—	—
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	9	6	10
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	—	—	—
Diabetes Insipidus	—	—	—
Diphtheria	—	—	—
Dysentery	6	1	6
Enteric Fever	—	—	—
Erysipelas	—	—	—
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	10	—	11
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	41	2	41
Kala-Azar	—	—	—
Leprosy	—	—	—
(a) Nodular	—	—	—
(b) Anæsthetic	—	—	—
(c) Mixed	—	—	—
Malarial Fever—	42	3	44
(a) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(b) Remittent	—	—	—
(c) Pernicious	—	—	—
(d) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	2	—	2
Malignant	16	1	17
Old Age	—	—	—
Other Diseases	57	3	57
Pellagra	—	—	—
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	13	—	13
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	6	5	6
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(a) Primary	2	—	3
(b) Secondary	2	—	2
(c) Tertiary	33	4	38
(d) Congenital	—	—	—
Tetanus	2	1	2
Trypanosoma Fever	—	—	—
Tubercle—	9	1	11
(a) Phthisis Pulmonalis	—	—	—
(b) Tuberculosis of Glands	—	—	—
(c) Lupus	—	—	—

GENERAL DISEASES—continued.

(d) Tabes Mesenterica	—	—	—
(e) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	—	—	—
Yaws	—	—	—
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the —			
Cellular Tissue	43	1	44
Circulatory System	—	—	—
(a) Valvular Disease of Heart	11	6	13
(b) Other Diseases	4	—	4
Digestive System—	2	—	2
(a) Diarrhœa	—	—	—
(b) Hill Diarrhœa	—	—	—
(c) Hepatitis	—	—	—
Congestion of Liver	5	1	5
(d) Abscess of Liver	—	—	—
(e) Tropical Liver	—	—	—
(f) Jaundice, Catarrhal	—	—	—
(g) Cirrhosis of Liver	—	—	—
(h) Acute Yellow Atrophy	—	—	—
(i) Sprue	—	—	—
(j) Other Diseases	—	—	—
Ear	1	—	1
Eye	31	—	31
Generative System—	—	—	—
Male Organs	44	—	37
Female Organs	124	3	132
Lymphatic System	—	—	—
Mental Diseases	—	—	—
Nervous System	17	2	20
Nose	18	—	19
Organs of Locomotion	15	—	15
Respiratory System	40	10	40
Skin—	—	—	—
(a) Scabies	—	—	—
(b) Ringworm	—	—	—
(c) Tinea Imbricata	—	—	—
(d) Favus	—	—	—
(e) Eczema	1	—	1
(f) Other Diseases	162	—	187
Urinary System	40	7	43
Injuries, General, Local—	—	—	—
(a) Siriasis (Heatstroke)	—	—	—
(b) Sunstroke (Heat Prostration)	—	—	—
(c) Other Injuries	73	4	79
Parasites—	—	—	—
Ascaris lumbricoides	3	—	3
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duo- denale	33	—	34
Filaria medinensis (Guinea-worm)	4	1	4
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	—	—	—
Amputations, Major	—	—	—
" Minor	1	—	1
Other Operations	296	5	296
Eye	—	—	—
(a) Cataract	12	—	12
(b) Iridectomy	—	—	—
(c) Other Eye Operations	44	—	44

Colonial Medical Reports.—No. 124.—St. Vincent (continued).

During 1915 work was completed in two districts, i.e., Calliaqua and Belair. During 1916 work was completed in three districts, i.e., Sion Hill, Stubbs and Mesopotamia. During 1917 work was completed in four districts, i.e., Biabou, New Ground, Colonarie and Georgetown. During 1918 only one district was worked, i.e., Lowmans on the leeward coast.

The following table shows the number of persons censured, the number examined, the number infected, the number treated, and the number cured.

District	Census	Examined	Infected	Percent.	Treated	Cured
Calliaqua ...	2,544 ...	2,544 ...	801 ...	31 ...	773 ...	627
Belair ...	1,281 ...	1,278 ...	875 ...	68 ...	817 ...	723
Sion Hill ...	1,880 ...	1,853 ...	1,120 ...	60 ...	1,030 ...	907
Stubbs ...	2,362 ...	2,346 ...	1,063 ...	45 ...	978 ...	887
Mesopotamia ...	3,325 ...	3,295 ...	1,879 ...	51 ...	1,740 ...	1,520
Biabou ...	2,025 ...	2,017 ...	1,087 ...	53 ...	1,027 ...	880
New Ground ...	2,283 ...	2,279 ...	1,532 ...	67 ...	1,456 ...	1,353
Colonarie ...	2,129 ...	2,121 ...	1,484 ...	70 ...	1,364 ...	1,177
Georgetown ...	2,587 ...	2,580 ...	1,599 ...	62 ...	1,508 ...	1,439
Lowmans ...	1,121 ...	1,117 ...	955 ...	85 ...	884 ...	766
Totals ...	21,537	21,430	12,395	592 = 47.3	11,577	10,279

The portion of the windward coast beyond the Dry River was so difficult of access and this territory was so sparsely populated that it was not thought advisable to conduct an intensive campaign here, so the people living in this territory were invited to come to the Field Office in Georgetown for examination and treatment. 485 persons from this territory were examined, and of these 363, or 74 per cent., were found to be infected. 328 of these were treated, and 150 continued to come for treatment until they were cured.

EDUCATIONAL WORK.

Public lectures illustrated by lantern slides have been given in all of the districts in which a suitable building was available.

Lectures illustrated by charts and microscopic demonstrations have been given in all of the schools in the districts worked, and microscopic demonstrations have been given in the Field Office and in many of the homes.

The following figures show the number of the lectures together with the attendance:—

Lectures to schools, 19; attendance, 2,192. Public lectures, 15; attendance, 4,650.

SANITARY.

In addition the sanitary preventive work of providing "fly-proof" latrines and closets of an approved pattern in view of the important part it plays in the eradication of the disease has proceeded uninterruptedly throughout the year, notwithstanding the closing down of the examination and treatment department of the campaign. 450 new latrines have been erected.

YAWS PREVENTION.

The yaws dispensaries have continued their work during the year under review.

The following figures show the admissions and discharges for the period from April 1, 1918, to March 31, 1919:—

Remaining over from 1917-18, 619; admitted during 1918-19, 380; discharged, 299; still under treatment, 324.

During the three years that this campaign has been carried on, the following results have been obtained:—

Total cases treated from April 1, 1916, to March 31, 1919, 2,688.

Total cases discharged cured from April 1, 1916, to March 31, 1919, 1,451.

Total cases still under treatment, 324.

PUBLIC HEALTH.

The work of the Government Sanitary Department and fortnightly inspections of the District Sanitary Police have been carried out regularly throughout the year.

In consequence of the prevalence of typhoid fever in certain areas in the No. 5 District, Mr. H. C. Theobalds was specially appointed to that district as sanitary inspector.

HOSPITALS AND ASYLUMS.

The total number of persons treated in the hospitals and asylums of the colony for the year was 1,341.

The number of attendances returned under the medical relief scheme was 13,898.

This return includes paupers, labourers, labourers' children under 10 years of age, police constables and prisoners at police stations.

REPORT OF THE MEDICAL OFFICER, KINGSTOWN DISTRICT.

COLONIAL HOSPITAL, ST. VINCENT.

June, 1919.

The population of the district comprising the town of Kingstown and adjacent village of Edinboro is estimated at 5,000.

There were 205 births and ninety-nine deaths, giving a birth-rate of 41 per thousand, and a death-rate of 19.8 per thousand. There were ten still-births.

The deaths at the Colonial Hospital are not included in the above figures, but are accounted for in the report on that institution.

The total number of deaths including those at the institutions was 180.

Sickness was more prevalent and accompanied by a higher death-rate in the latter half of the year: 1,890 cases with sixty-two deaths being recorded as against 1,720 cases with thirty-eight

deaths in the first half of the year. Epidemic influenza played a large part in the increase of cases and deaths.

Of notifiable diseases recorded there were six cases of chicken-pox, eighteen cases of measles, nineteen cases of yaws, and forty-one cases of pulmonary tubercle with seventeen deaths.

Among other diseases there were 591 cases of catarrhal fever with fourteen deaths, fifty-two cases of infantile diarrhoea with twenty-seven deaths, and sixty-four cases of syphilis (late manifestations) with seven deaths, eight cases of malaria with no deaths were recorded as against ninety-one with one death in the previous year.

The sanitary condition of the town of Kingstown has been fairly well maintained.

Vaccinations have been regularly performed throughout the year.

CYRIL H. DURRANT, M.B.,
Medical Officer, Kingstown District.

REPORT OF THE MEDICAL OFFICER, No. 1 DISTRICT.

KINGSTOWN, ST. VINCENT,

July, 1918.

The estimated population is about 7,200.

There were 184 births and 144 deaths during the year, giving a birth-rate of 25.5 per thousand, and a death-rate 20.0 per thousand.

Sickness was more prevalent in the latter half of the year due to the influenza epidemic in the latter quarter of the year.

Seventeen cases of measles and two cases of whooping-cough also occurred in the latter half of the year.

Catarrhal fevers (including epidemic influenza), 206 cases with fourteen deaths; diarrhoeal diseases of children, sixty-five cases with thirty-one deaths; and syphilis, thirty-six cases with ten deaths account for nearly 25 per cent. of the cases treated during the year.

Pulmonary tuberculosis accounted for nine cases with four deaths. Twenty-seven cases of yaws were recorded.

The general sanitary condition of the district has on the whole been satisfactory.

Two hundred and twenty children were successfully vaccinated.

CYRIL H. DURRANT.

REPORT OF THE MEDICAL OFFICER, No. 2 DISTRICT.

KINGSTOWN, ST. VINCENT,

July, 1919.

Estimated population, 10,000; births, 353; deaths, 186; stillbirths, 22; giving a birth-rate of 35.3 per thousand and a death-rate of 18.6 per thousand.

Diarrhoea in children amounted to 139 cases with fourteen deaths; catarrhal (including epidemic

influenza) accounted for 164 cases with seventeen deaths; while pulmonary tuberculosis claimed twenty-one cases with twelve deaths.

The general sanitary condition of the district has been satisfactory.

Two hundred and forty vaccinations were successfully performed.

Advice on child-bearing was given by the Government nurse-midwife, Ethel G. Thompson, according to circumstances in each case. The mothers were instructed as to the kind of food to be given. The intervals of feeding and the number of meals per day. The necessity and advantages of frequent bathing, and of fresh air, as well as first-aid in any of the simpler ailments of childhood, concerning which the mothers were for the most part ignorant.

Mothers were lectured on various subjects, such as personal hygiene, care of infants, and sanitation.

CYRIL H. DURRANT.

REPORT OF THE MEDICAL OFFICER, No. 3 DISTRICT.

BELAIR,

June, 1919.

The last four months of the year from December to March were the months during which sickness was most prevalent due to the epidemic of influenza and its sequelæ; the mortality in these four months totalled seventy-three, about half the number for the year. The month of December was the worst in the year for sickness and mortality, 352 cases being recorded with twenty-two deaths.

Of notifiable diseases there were: Chicken-pox, two cases; measles, two cases; yaws, seventy-five cases; pulmonary tuberculosis, twenty-five cases with six deaths. Of others: catarrhal fevers, 329 cases with twenty deaths. Diarrhoea in children, 244 cases with sixteen deaths, and sixty-eight cases of dysentery with thirteen deaths. Syphilis, twenty-nine cases with four deaths. Twenty-five cases of malaria with no deaths. Three cases of filaria and one of tetanus which proved fatal, 151 cases of ulcers, seven cases of ankylostomiasis.

GENERAL SANITARY CONDITION OF THE DISTRICT.

Water Supply.—The town of Calliaqua alone has a definite source of water supply; there is, however, a small reservoir at Belmont, where some of the people are able to obtain water, and another at Hopewells, otherwise the chief source of water supply is from springs and streams.

Sanitary Arrangements.—The pit system is chiefly in vogue. A few have the pail system.

Drainage.—Purely surface flow. There is no definite drainage system anywhere. Rain water flows off in natural channels.

The medical officer himself pays periodical visits of inspection to the various towns and villages in his district.

The general health of the inhabitants of this

district was good except for the epidemic of influenza, which naturally lowered the standard of general health for a period.

Two hundred and ten vaccinations were successfully performed during the year.

The health of the inhabitants of this district has materially improved; this improvement is in a great measure the result of the ankylostomiasis campaign and the accompanying sanitary changes.

W. A. GEORGE,
Medical Officer, District 3.

REPORT OF THE MEDICAL OFFICER, No. 4 DISTRICT.

THE CEDARS,

July, 1919.

Sickness was most prevalent during the last quarter, when a severe epidemic of influenza occurred. This began in the end of December, reached its highest point in January, and gradually subsided in February.

Catarrhal fevers and children's diseases provided the largest number of cases. There were 215 cases of former and 176 of latter. Thirty-six new cases of yaws were admitted to dispensaries. Syphilis furnished fifty-two cases.

The sanitary condition of the district was on the whole satisfactory. The district is remarkably free from malaria. In all the villages, however, cases of yaws can be found. This disease is spread through the carelessness of the people and the lack of ordinary precautions. The belief held by many of them that this disease is an affliction sent by God, and that it is foolish and useless to take any precautions against infection is one of the chief causes of its prevalence.

The number of successful vaccinations was 209. The lymph was unsatisfactory during the early part of the year—no doubt owing to war conditions.

D. A. GREAVES,
Medical Officer, District 4.

REPORT OF THE MEDICAL OFFICER, No. 5 DISTRICT.

GEORGETOWN, ST. VINCENT,

August 1, 1919.

The figures for the year ending March 31, 1919, show a marked decline in the birth-rate and increase in the death-rate per 1,000 of the population in the last three years.

There were 276 more cases of sickness from all causes during the first six months, April to September, than in the last six months, October to March, and the quarter July to September was the most unhealthy with 115 more cases than occurred during the next most unhealthy quarter, January to March.

Of diseases that occur all the year round (a) catarrhal fevers, including cases of acute coryza and epidemic influenza, were most prevalent during

the July to September quarter. The greatest number of cases in this group in any individual month occurred in January, which marked the culmination of the great influenza epidemic of the year.

(b) Diarrhoea in children prevailed to a greater extent in the July to September quarter, and the largest number of cases was seen in July.

(c) Dysentery was very marked from July to September, and reached the highest figure in July.

Of epidemic diseases, measles, which does not occur every year, accounted for twenty-eight cases confined to the last quarter of the year.

METEOROLOGICAL CONDITIONS AFFECTING THE GENERAL HEALTH.

The July to September quarter is associated both with increase in sickness and fatality and with increase in rainfall, with a close humid atmosphere. It is highly probable, therefore, that these atmospheric changes influence the incidence of disease directly or indirectly, perhaps in both ways, and militate against recovery.

REMARKS ON PARTICULAR DISEASES OCCURRING DURING THE YEAR.

Amongst specific infectious diseases occurring during the year are enteric fever, diphtheria, measles, chicken-pox and pulmonary tuberculosis. Of these special mention should be made of enteric fever and pulmonary tuberculosis.

Enteric Fever.—A small outbreak occurred at Mt. Young Village with a few cases outcropping at Byera. Eighteen cases were diagnosed, and of these eight died, giving a case mortality of 44 per cent. This is a disease which persists and thrives under poor sanitary conditions, and is to be dreaded on account of its virulence and the ease with which it spreads. The vigorous sanitary campaign undertaken against it happily resulted in its being confined within manageable limits.

Pulmonary Tuberculosis.—The victim of this disease is doomed. Measures directed towards prevention, not attempts to cure after its occurrence, seem to offer the only hope of success in combating the disease. My impression is that tuberculosis of the lungs is slowly but surely assuming menacing proportion amongst the population.

Yaws.—Forty-nine cases occurred. There were no deaths. Only the graver cases seek medical advice, and it is widespread. Though not in itself fatal, it causes more sickness and invalidism than many of the other diseases combined.

Catarrhal Fevers.—This is a group of disease conditions including more especially acute coryza and epidemic influenza. It heads the list of diseases with 325 cases. There were ten deaths, giving a case mortality of 3 per cent.

An unusually severe type of influenza visited the district in the last week of December. It was our share of the great pandemic of the year. It spread with great rapidity, reached its height in January,

and had by the end of February died down to negligible proportions. Fortunately very few deaths resulted.

Diarrhœa in Children.—As in former years was prevalent. There were 157 cases and twenty-three deaths—a case mortality of 14.6 per cent. Its causes are amongst infants, improper feeding, and in older children, bad feeding and intestinal parasites.

The appointment in December of a sanitary inspector whose whole time could be given to getting sanitary measures carried out was a distinct advance in our methods.

Year by year soil pollution in the villages and contamination of water supply with human and animal excrement had been going on, and there was no adequate system of conservancy.

The problem of human excrement is being met by the installation of pit closet (fly-proof) in the villages. These will require efficient inspection to prevent overfilling, waterlogging and accessibility to flies.

The disposal of refuse and stock manure has also been engaging attention.

One hundred and twenty-two vaccinations were performed.

Swamp land at the mouth of the Grand Sable River was drained. An attempt was made to stock the river mouth with "millions," but this proved unsuccessful.

C. M. AUSTIN,
Medical Officer, District 5.

REPORT OF THE MEDICAL OFFICER, No. 6. DISTRICT.

BELLE VUE HOSPITAL, CARRIACOU,

May 15, 1919.

REMARKS ON PARTICULAR DISEASES.

Malaria.—Thirty cases were treated. No deaths.

Syphilis.—Two cases of congenital syphilis in infants were seen. Death resulted in each case.

Pulmonary Tuberculosis.—Four cases were seen, all in the last stage of the disease. Death resulted in each case.

Sufferers from this malady almost invariably seek medical aid when it is too late to derive any benefit.

The swamp at Ashton, Union Island, still remains a menace. Otherwise the sanitary condition requires no special comment.

E. DE J. MCSWEEN,
Medical Officer, District No. 6.

REPORT ON THE COLONIAL HOSPITAL.

COLONIAL HOSPITAL, ST. VINCENT,

June, 1919.

ADMISSIONS, &c.

There were 982 cases admitted to the wards of the General Hospital during the year, making, with

sixty-seven cases remaining over from 1917-1918, a total of 1,049 cases treated.

In addition thirty-five cases were admitted to the Graham Wing; of these three died.

The total number of cases, therefore, treated at the hospital for the year under review was 1,084, sixteen less than in the previous year.

Of the cases admitted to the wards of the General Hospital, syphilis, in one or other of its various stages, accounted for thirty-seven admissions, ulcers (other than those of syphilis or frambœsial origin) for 155 admissions, and intestinal parasites (ascaris and ankylostoma) for forty admissions. Influenza and pneumonia accounted for seventy-four admissions with six deaths.

There were forty-two admissions for malaria with three deaths. Tuberculosis provided thirty-three cases with eight deaths.

There were sixty-two deaths, including three in the Graham Wing, giving a death-rate of 5.7 per cent. of the total number of cases treated.

The number of cases admitted to the Maternity Department, which is maintained as a training school for nurses, was 101.

Four probationer nurses completed their course of training, and after examination were granted certificates to practice as midwives.

There were 3,611 patients treated at the Out-Patient Department, which is also the Dispensary for the Kingstown district. Of these ninety-nine died, giving a death-rate of 27 per thousand.

Of the cases applying for treatment, "catarrhal fever" heads the list with 591 cases with fourteen deaths. Cases of epidemic influenza are included under this heading. Malaria accounts for eighty-seven cases.

Syphilis accounts for sixty-four cases with seven deaths from the later ravages of the disease.

The diarrhœal diseases of children provide fifty-two cases with twenty-seven deaths, and pulmonary tubercle forty-one cases with seventeen deaths.

Of zymotic diseases there were six cases of "chicken-pox" and eighteen cases of measles recorded.

CYRIL H. DURRANT, M.B.
Colonial Surgeon.

REPORT OF THE CHIEF HEALTH OFFICER.

SANITARY DEPARTMENT, KINGSTOWN,

June, 1919.

Epidemic influenza made its appearance in the colony towards the end of December, 1918, and spread rapidly throughout the colony. The epidemic was on the whole an unusually severe type of influenza; it was our share of the great pandemic. It is impossible to form any idea of the exact number of cases that occurred, owing to the suddenness of the onset, and the great prostration accompanying it. Many of the victims failed to obtain medical advice and these cases have not been recorded.

Colonial Medical Reports.—No. 124.—St. Vincent (continued).

The medical officer, Dr. C. C. M. Austin, writes in connection with this outbreak: "This is a disease which persists and lives under poor sanitary conditions, and it is to be dreaded on account of its virulence and the ease with which it spreads. The vigorous sanitary campaign undertaken against it happily resulted in its being confined within manageable limits."

The supply of milk for the use of public institutions has been obtained from a local contractor. The milk supplied has been uniform in quality and very satisfactory. Owing, however, to the absence of a supervision of the milk supply, very little has been done to ensure the supply of clean wholesome milk to the public. The examination of all milk sellers and cowkeepers has been carried out regularly throughout the year.

The bakeries and aerated water factories were frequently inspected during the year, and improvement is noted in the sanitary condition maintained. The employees engaged in them have been

regularly examined, and no prosecutions have been undertaken for breaches of the regulations.

The sanitary condition of the colony has on the whole been well maintained. The district sanitary police has carried out the fortnightly inspections of the villages and small towns of the colony with satisfaction. Some of the reports sent in show careful inspection work, especially as regards "mosquito prevention," and I should like to see the same zeal displayed with regard to the promiscuous deposit of excreta, a highly insanitary practice which is very prevalent and only referred to and dealt with by two or three inspectors. With regard to the town of Kingstown, attention should be directed to the regulations dealing with the disposal of "night soil," and the practice of continual fouling of the North River should be dealt with.

The rat campaign has proceeded during the year, 5,358 were dissected and examined by the rodent examiner. No infected rats were found.

CYRIL H. DURRANT, M.B.

Chief Health Officer.

Colonial Medical Reports.—No. 125.—Trinidad and Tobago.**REPORTS FOR THE YEARS 1917-18.**

By F. A. de VERTEUIL,

Acting Surgeon-General.

POPULATION was estimated by the Registrar-General to be 375,559 at the middle of the year 1917. In 1916 it was 368,231.

The density of population was 201 persons per square mile.

The total number of births registered was 12,566; of these 6,346 were males and 6,220 females. The birth-rate was 33.46 per 1,000 of population.

The number of stillbirths during the year was 925 (476 males and 449 females). It is well known that many infants are born dead as a direct result of ignorance of the kind neighbour or the unqualified "midwife" who has for several generations helped to bring into life most of the men and women born and now living in the particular village.

One of the most important measures against the high rate of infantile mortality in the Colony will be the provision of modern qualified district nurse-midwives in all districts of the Colony without exception.

The total number of deaths from all causes registered in the Colony was 7,982, the death-rate per 1,000 living being 21.25.

In all districts the birth-rates were higher than the death-rates except in Port-of-Spain and San Fernando. Theoretically, and judged from a comparison between the birth- and death-rates, the healthiest place in the Colony during 1917 was

Montserrat, the next being Blanchisseuse, and the next Savana Grande. San Fernando similarly was the least healthy and Port-of-Spain next.

The very high mortality in the two towns, and principally in San Fernando, is due to the large influx in the colonial hospitals of sick persons, many of whom are admitted in a hopeless condition and die soon after admission.

In Port-of-Spain nearly a third of the total number of persons who died in the Colonial Hospital came from outside districts, and in the San Fernando Hospital approximately two-thirds of the number who died were from places outside the town.

Infant mortality shows a tendency to increase in the capital as well as generally throughout the Colony.

This high rate of mortality among infants has for a long time been recognized to be a serious matter, and the problem must be dealt with from various angles and the malady treated by various remedies.

As far back as May, 1904, Dr. Dickson, then Assistant Medical Officer of Health of the Colony, submitted a report dealing with the excessive infant mortality in Port-of-Spain.

The following are the proved facts:—

(1) Infant mortality is excessive.

(2) The majority of deaths occur in the first three months of life.

(3) During the first month when it is at its highest the deaths are due to congenital defects and maternal ignorance or carelessness, as well as to weakness and constitutional disease of the mother.

(4) In succeeding months the chief cause of death is the group of diarrhoeal diseases, the result of improper and careless feeding.

The only district nurse in the country at present is the one at Tunapuna, who is doing splendid work.

In 1915 the then Surgeon-General, Dr. Clare, suggested an out-patient maternity department attached to the Colonial Hospital, Port-of-Spain. Two trained midwives were employed as district nurses. They have done and are doing much useful work in the town in attending on midwifery cases and in visiting infants and advising upon their proper feeding and care.

In July, 1916, Dr. Clare submitted a scheme for further dealing with high infant mortality, including:—

(a) Early notification of births and

(b) Establishment of a Mothers' and Infants' Clinic at the Colonial Hospital, Port-of-Spain.

As has been well known for a long time, enteric fever is very prevalent in Port-of-Spain and to some extent in other districts.

Even without compulsory notification 163 cases were observed with thirty-eight deaths during 1916 in Port-of-Spain. The figures for 1917 were 176 cases with fifty-one deaths. Though a larger number of cases was brought to notice in 1917 than in 1916, it does not necessarily mean that there was a greater prevalence in 1917, as many cases were never heard of in 1916. These unknown cases are the ones which hitherto have constituted the greater menace to the public health; for with regard to them no precautionary measures of any kind were or could be applied, and they were foci from which the disease spread unhindered.

In districts outside Port-of-Spain the position is even more striking, for it was only occasionally that any case of infectious disease (other than dangerous infectious diseases, viz., yellow fever, plague and small-pox, concerning which special regulations existed) was brought to the notice of the health authority.

In Tobago there is a remarkable absence of enteric, in spite of the free and intimate communication between the Island Ward and Port-of-Spain.

Now that all cases of enteric which are seen by medical practitioners are notified, there is every reason to hope and believe that the increased attention to general sanitary matters which is observed on all sides will assuredly result in a gradual diminution from year to year in the number of cases of enteric and ultimately in its extinction.

Though sporadic cases of diphtheria are observed from time to time, the disease has never been known to occur in epidemic form in any part of the Colony. As in other countries the beneficial effects of treatment by diphtheria antitoxin, when administered early in the course of the disease, has been very striking here.

At a meeting of the Central Board of Health, held on May 9, 1917, an important resolution was moved by Dr. Prada recommending that tuberculosis (in all its forms) should be proclaimed an infectious disease under Section 100 of the Public Health Ordinance, and therefore made compulsorily notifiable. This resolution, which was the outcome of representations made by the Medical Officer of Health, Port-of-Spain, who is also Tuberculosis Officer under the Association for the Prevention and Treatment of Tuberculosis, was amended on the motion of Dr. Laurence to apply only to pulmonary tuberculosis, and was passed as amended.

Three hundred and sixty-five cases were notified during the year, of which 248 were from Port-of-Spain, five from San Fernando, three from Arima, thirty-four from Tunapuna, and seventy-five from the rest of the Colony, bearing out the thesis that tuberculosis is the disease *par excellence* of crowded centres of population.

The solid work of education carried on by the Association for the Prevention and Treatment of Tuberculosis is bearing splendid fruit, and along with preventive measures carried out by sanitary authorities everywhere must result in a marked diminution in the ravages of this fell disease. This is a very satisfactory circumstance and augurs well for the future.

Malaria.—This disease prevails in most districts outside the limits of Port-of-Spain. The proximity of the south-eastern portion of the town to the Laventille swamp makes it impossible to absolutely exclude all chances of malaria infection manifesting itself within the city limits. Nevertheless, in my report of the health of Port-of-Spain for 1916 I showed that twenty-five cases of malignant malarial fever occurring in the city which were investigated were all traced to sources outside the city or from Venezuela.

The anopheles survey of the Colony, which was suspended on April 30, 1915, was resumed in July, 1917, and by December 31, 1917, the surveys of all districts were completed.

DISTRIBUTION OF QUININE TO SCHOOL CHILDREN.

Quinine bisulphate in tabloid form and in 5 to 3-gr. doses was issued by the district medical officers to the teachers of the schools.

Ankylostomiasis prevailed in most districts, but occurred in largest numbers, as in previous years, on the large sugar estates with their large East Indian population.

The Trinidad Ankylostomiasis Commission has carried on its operation against hookworm disease. Local authorities are being urged to give every help to the Commission's work, and the medical officer, Dr. Payne, was in constant communication with this department with a view to bringing about necessary improvements in latrine accommodation generally.

The number of deaths registered as due to ankylostomiasis in the whole Colony during the year was 240, i.e., a rate of 0.64 per 1,000.

The following is a return of prisoners examined

and treated for ankylostomiasis at the Royal Gaol:—

First Treatment: Number of prisoners treated, 2,830; number of prisoners who passed worms, 1,880, i.e., 66·4 per cent. infected.

Second Treatment: Number of prisoners treated, 1,468; number of prisoners who passed worms, 867, i.e., 59 per cent. infected.

Third Treatment: Number of prisoners treated, 1,170; number of prisoners who passed worms, 417, i.e., 35·6 per cent. infected.

INTRODUCTION.

The year 1917 may be properly looked upon as one of preparation and of adaptation of machinery, authorities and officers under the old regime to an entirely new state of things brought into being by the new law.

Though some material progress was made in the sanitary affairs of the Colony in the course of the year, and more so in some districts than in others, yet on the whole the record is necessarily one of preliminary effort and spade work, the beneficial effects of which will appear in future years.

Sanitary Administration.

The New Ordinance provides for a Central Board of Health which controls the activities of all local sanitary authorities.

The chief executive official in every district is the medical officer of health. This is necessarily so (as he is the health expert) and is readily realized in most districts, the medical officer of health having the sanitary inspector under his direct authority in sanitary matters as is provided by the bye-laws.

Previous to the coming into force of the new Public Health Ordinance medical officers had nothing to do with public health work except under the Surgeon-General's special directions in case of the outbreak of any dangerous infectious disease. In the carrying out of sanitary measures of any kind the medical officer must have direct control of the sanitary inspector. The position will be susceptible of clarification later when the local authorities in rural districts will be small local boards as contemplated by the Ordinance and not individuals as at present.

The Public Health Ordinance, 1915.

This very comprehensive Ordinance came into force on January 1, 1917. It is divided into seven-teen parts dealing with the following subjects, viz.:—

Constitution and powers of board and local authorities, streets, building areas, dwelling houses, privies, dustbins and drains, scavenging and cleansing, nuisances, offensive trades, sale of milk, water supply, infectious diseases, common lodging houses and barrack yards, bakehouses, mosquitoes, retail shops, factories and workshops, miscellaneous.

The Ordinance creates machinery for carrying out its provisions.

Central Board of Health.

The Governor was appointed chairman of the Central Board of Health, and nine members were appointed by the Governor.

The Central Board of Health held three meetings during the year. It possesses large powers of supervision and control over local authorities, and is empowered to make bye-laws to be applicable to any district. Through its officers it may at any time assume all the functions of any local authority.

Sanitary Districts.

The Colony is divided into local sanitary districts each under the charge of a local authority.

HEALTH DISTRICTS.

The Medical Inspector of Health is the chief Executive Officer of the Central Board of Health.

On January 1, 1917, I assumed the duties of a new substantive post, viz., Deputy Surgeon-General and Medical Inspector of Health. The duties of the post are analogous to a combination of those of the medical officer and a medical inspector of the Local Government Board in England.

I was fortunate at the outset to have obtained very valuable advice as to the duties of the post and the best manner of carrying them out from the Medical Officer, L.G.B., England, Sir Arthur Newsholme, and Professor Henry Kenwood, my teacher at University College, London.

The district medical officers are *ex officio* medical officers of health of their districts.

The appointment of sanitary inspectors is provided for, but it seems necessary to amend the law so as to require certain qualifications.

The local authorities of Port-of-Spain, San Fernando and Arima in the course of the year made bye-laws dealing with the following subjects, viz.:—

House refuse, removal and carriage of offensive matter, sale of milk, common lodging-houses, barracks and barrack yards, bakehouses, mosquitoes, shops.

They were duly approved of and confirmed by the Governor. As regards rural districts bye-laws were made dealing with bakehouses.

A class examination was held at Arima on February 17, 1917, after a course of lectures to school teachers, and an examination for sanitary inspectors was held on June 2, 1917, and resulted in fourteen candidates being successful.

Medical Inspection—Elementary Schools.—On February 27, 1917, I suggested that as district medical officers in rural districts would be managers of elementary schools, it seemed that they should be able to perform at least part of the duties involved in medical inspection of schools in conjunction with their duties as managers.

In some districts the district medical officers were appointed managers of schools, and it is presumed that on their formal visits they carry out more than a layman's inspection and do occasionally detect cases of contagious and eye diseases.

A new form was adopted for quarterly reports

on the sanitary condition of Government and assisted elementary schools throughout the Colony. The quarterly reports when received are immediately forwarded to the Inspector of Schools, who has powers to deal with schools in which the required standard of efficiency and cleanliness of latrines is not maintained. The wardens as local authorities of their districts also take action regarding any nuisances on school premises.

From my visits to schools in all parts of the country, I am satisfied that gradually elementary schools are falling into line in this important particular, and substantial improvements have already been effected in a great many schools.

Early in the year the attention of the Committee of the Trinidad Public Library was directed to the provision of the new Public Health Ordinance regarding public or circulating libraries. As a result the attention of all subscribers and of the general public was directed to the provisions by printed notices posted in prominent parts of the library as well as by advertisements in the daily newspapers.

Cases of the contagious disease known as barber's itch are observed from time to time.

Further, there is no control of any kind in the degree of cleanliness maintained in barber shops, some of which may well be described as filthy at most times. It seems, therefore, necessary that these shops should be regulated by bye-laws as is done in parts of the United States of America.

I paid visits of inspection to various districts and on the spot, with wardens and medical officers of health discussed the operations of the new Public Health Ordinance, the duties of health officials and all details connected with sanitary administration.

I found, generally speaking, a good deal of interest, which in a few districts amounted almost to enthusiasm, displayed by medical officers of health and wardens.

I paid a special visit to Princes Town in connection with an outbreak of enteric fever in that district, and found the sanitary state of the town to be very unsatisfactory, due principally to the want of a sanitary inspector. There were very few privies, and those that had been provided were inefficient and badly kept.

The drinking water supply of Princes Town is very unsatisfactory. It is mainly derived from shallow wells or ponds which are situated at the bottom of valleys and receive all the drainage of the surrounding slopes, not excluding sewage matter. Analysis by the Government analyst of two samples from ponds showed them to be unfit for drinking. The local authority was asked to have notices placed warning the people not to drink the pond water without previous boiling.

I pointed out in my report that the danger of a severe epidemic of enteric in the village was very imminent, especially in the absence of preventive measures, the first and most important of which was the regular inspection of premises by a trained sanitary inspector.

I recommended and selected a suitable officer who

took up duty on September 1, 1917. That the appointment was justified has been amply proved by the great improvements already effected in sanitary affairs generally, but specially with regard to the provision of sanitary conveniences on premises.

As regards both quantity and quality the water supply is not satisfactory in all districts of the Colony. Rain water is collected to some extent in cisterns, tanks, small barrels, and other receptacles.

In 1912, a year of severe drought, the Honourable the Director of Public Works submitted a valuable report on the state of the water supply in villages and country districts, and outlined a scheme for utilizing the spring and other sources found in the course of a search on Crown Lands and elsewhere, in a manner such that water might be available for the people to take it themselves when allowed to do so. There is no doubt that considerable improvements have thus been effected in local water supplies, but as the Director of Public Works stated in his report of December 14, 1912, the whole Colony had not been dealt with, and even when all his recommendations are carried out the problem will not be permanently solved.

The permanent and satisfactory solution of the water supply problem in all districts is one which it is hoped may be carried out in the not distant future, as it is undoubtedly a fact that the absence of a pure drinking water supply in some districts is an important contributory cause of the high incidence of certain diseases.

During the year analyses of two samples of shallow well water from the village of Arouca showed contamination by decomposing vegetable matter.

Two samples of the Port-of-Spain supply and one of the San Fernando supply were regularly examined each month during the year and found to be of normal quality. Monthly bacteriological examination of two samples of Port-of-Spain water showed the water to be safe for drinking.

Pollution of Streams.

Drinking supplies are obtained from rivers and streams in many districts.

Prevention of pollution of streams and ponds is provided for by Sections 87 to 90 of Ordinance No. 5, the warden being charged with the duty of seeing that their provisions are obeyed.

Section 87 refers to the Maraval River from which a portion of the Port-of-Spain supply is obtained.

The following are the Sections:—

87. Any person who shall bathe in any part of the Maraval River between the dam-head in the valley of Maraval and the Sea, and within view from any part of the public road leading from Port-of-Spain to the Ward of Santa Cruz, or who shall wash any clothes in the said river or on the banks between the said dam-head and the sea shall be guilty of an offence against this Ordinance and on conviction therefor before any Justice of the Peace shall forfeit and pay any sum not exceeding Twenty Pounds.

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(continued).

88. Every person who shall wash any clothes, or throw, or discharge any water which may have been used in the washing of clothes, or holding soap in solution, or any dirt or filth, or any noxious or fœtid matter of any description whatsoever, into any stream or pond, or water, whether running or not, without the permission of the owner of such stream, shall on conviction thereof, forfeit for every such offence any sum, not exceeding Five Pounds, and every person found committing any such offence may be immediately apprehended by any constable, or by the owner of the property on which the offence shall be committed, or by his servant, or by any person authorized by him, and forthwith taken before any Stipendiary Justice of the Peace, to be dealt with according to law.

89. Every owner of land who shall wash or cause, or permit any person to wash any clothes, or throw or discharge, or cause or permit any person to throw or discharge any dirt, filth, or other noxious or fœtid matter into, or in, any water running through such land whereby such water coming or flowing into any other land may be polluted and rendered unfit for use, shall on conviction thereof forfeit for every such offence any sum not exceeding Twenty Pounds nor less than One Pound.

90. Any penalty under Sections 88 and 89 hereof may be recovered on the information of the Warden, or of the owner of the property upon, or in respect of which such offence may have been committed, and every such penalty, if recovered on the information of the owner, shall be paid to such owner, which term shall in Sections 88 and 89 and in this section extend to and include any person having the immediate possession, or the management or charge of any land.

HEALTH REPORT FOR THE YEAR 1918.

Ey C. F. LASSALE,

Medical Inspector of Health.

Population was estimated by the Registrar-General to be 379,165 at the middle of the year 1918.

The density of population was 202 persons per square mile.

The total number of births registered was 11,760; of these 5,961 were males and 5,799 females; the birth-rate was 31.02 per 1,000.

It is satisfactory to record that there was an appreciable reduction in the number of stillbirths during 1918 as compared with the number in 1917.

In the entire Colony there were 775 stillbirths, being 150 less than the previous year.

During the year there were only two districts in which the services of district nurse midwives were available. The provision of trained district nurses must obviously cause a drop in the number of stillbirths.

It is interesting and of some importance to note

that the reduction in the number of stillbirths was not in direct proportion to the reduction on the total number of births. Had the same ratio obtained in 1918 as in 1917 between the total number of births and the number of stillbirths, there should have been 865 stillbirths in 1918 instead of only 775.

One hopes that there will be further reduction during the present year, and that before long all districts in the Colony without exception will be amply provided with qualified district nurse midwives.

DEATHS.

The total number of deaths from all causes registered in the Colony was 8,228, the death-rate per 1,000 living being 21.70.

The infantile mortality rate in Trinidad and Tobago has been reduced to some extent from 152 in 1917 to 138.4 in 1918. It is still, however, much higher than it should be, and if strenuous efforts are made in the right direction, a reduction in the next few years to 70 or 80 per 1,000 should result. This is not an impossibility. In a town in England the infantile mortality rate was reduced by half between the years 1913 and 1919 from 119 to 59 per 1,000 births by methods which are well known, and a child welfare scheme exactly on the same lines as those we are attempting to work in this Colony.

Enteric fever was very prevalent during the year.

The remarkable feature is again evident that, in spite of free communication between Trinidad and Tobago, enteric fever is practically unknown in the latter island, although the sanitary condition of Tobago on the whole is not up to the standard of that of Trinidad, especially Port-of-Spain. There is, as Dr. Pawan points out, some condition in Tobago connected possibly with the nature of the soil or other causes, which makes it impossible for enteric to gain a footing in that island. The absence of cases of enteric fever in Toco and Erin must also be recorded as worthy of note.

The number of deaths from enteric fever in 1918 was 248, showing a death-rate of 0.65 per 1,000 of population, from which it is clear that the disease has increased considerably.

In connection with a small outbreak at Caparo I visited the district on May 11, 1918, and found that several cases had occurred on an estate. Steps were promptly taken to disinfect the affected premises, and a few persons were immunized.

Samples of water from two parts of the Caparo River were submitted to analysis and found to be unfit for drinking purposes. A third sample from a spring was found to be of a low degree of purity. I suggested that notices should be placed at suitable spots on the banks of the rivers Caparo, Arena, and Grande Ravine (Todd's Road) warning people against bathing and washing in the rivers or otherwise polluting them.

There was unusual prevalence of enteric fever in the San Juan district during the first and second quarters of the year.

The cases were with few exceptions removed to the St. Joseph District Hospital for treatment. At one time there were over twenty cases in that institution.

Through the kindness of the local authority, Port-of-Spain, the services of one of their qualified sanitary inspectors were engaged for a period of six weeks for special work of inspection, disinfection of premises, and instructing the people by explaining and distributing leaflets. He worked under the direction of the medical officer of health, to whom he submitted regular weekly reports.

Preventive Measures against Enteric.—Immediately following the notification of cases, inspection and inquiry are carried out and disinfection of premises, bedding, clothing, &c., done as soon as possible.

Fly reduction has been gradually extended in rural districts. Bye-laws dealing with the protection of foodstuffs from contamination by flies and dust have been enforced.

Immunization or protective inoculation has been carried out at the Health Office, Port-of-Spain, twice weekly. In country districts the usefulness of the measure was also appreciated by the people as well as medical practitioners (Government and private). The result has been that from January 1, 1918, to December 31, 1918, 765 persons were inoculated in various parts of the Colony.

Five hundred and ten cases of pulmonary tuberculosis were notified during the year.

The number of deaths was 545, and the tuberculosis death-rate 1.44 per 1,000, a slightly higher rate than the previous year.

Dr. G. H. Masson did valuable work at the Tuberculosis Dispensary, and the new ward at the Colonial Hospital for advanced cases of tuberculosis has been a tremendous boon to the poor sufferers; it has also served the useful purpose of an isolation hospital for consumptives.

On the whole the outlook for the control of tuberculosis is fairly satisfactory, though much remains to be done in the way of providing a sanatorium for the housing and cure of early cases, and a hospital for the segregation of advanced cases which are a danger to the community at large.

As usual, cases of malarial fever, both benign and malignant, as well as malarial cachexia, prevailed widely throughout the various districts of the Colony.

A spleen census of as many children as possible was taken in the last three months of the year, i.e., the time following the fever season when the splenic enlargement rate would be expected to be highest. The results obtained were on the whole very satisfactory, the percentage being 11.2 in the entire Colony out of 20,590 children examined.

The number of deaths from malaria registered was 834, and the malaria death-rate 2.19 per 1,000 inhabitants.

PREVENTION OF MALARIA.

The anti-malarial campaign during the year consisted mainly of the carrying out of minor works,

viz.: Oiling regularly all collections of stagnant water in and around villages; clearing obstructed drains of rubbish, débris, leaves; straightening the course or training of small watercourses and abolishing small pools in them and their banks; draining and oiling "borrow-pits" at the sides of roads and railway lines in the vicinity of villages.

In San Fernando similar preventive measures were regularly carried out by the Borough Council as local authority for the town, resulting in the eradication of numerous anopheles breeding grounds.

A temporary mosquito-proof convict dépôt to house 100 prisoners was erected at Laventille, just outside the town boundary, north of the eastern main road and west of the Government quarry. The prisoners have been employed in the useful work of reclaiming a part of the Laventille swamp north of the railway line with earth from the quarry.

In the Colonial Hospital, Port-of-Spain, there were 164 cases of ankylostomiasis treated with fifteen deaths, and in San Fernando Hospital 477 cases and twenty-nine deaths.

The Trinidad Ankylostomiasis Commission carried on its campaign against hookworm disease.

The number of deaths registered as due to ankylostomiasis in the whole Colony during 1918 was 211 with a rate of 0.56 per 1,000.

The following is a return of prisoners examined and treated for ankylostomiasis at the Royal Gaol:—

First Treatment: Number of prisoners treated, 3,120; number of prisoners who passed worms, 1,991, i.e., 63.8 per cent. infected.

Second Treatment: Number of prisoners treated, 1,552; number of prisoners who passed worms, 851, i.e., 54.8 per cent.

Third Treatment: Number of prisoners treated, 1,126; number of prisoners who passed worms, 310, i.e., 27.5 per cent. infected.

The Colony was affected by the pandemic of influenza during the last three months of the year. There were forty-six deaths from influenza registered during the year, forty-one being in the last quarter.

The cases were numerous, and a few fatal cases of influenzal pneumonia occurred.

That the disease did not assume alarming proportions is shown by the fact that the number of deaths from bronchitis and pneumonia during 1918 was 637 as compared with 726 in 1917.

PUBLIC HEALTH ADMINISTRATION.

The year 1918 saw a further advance in the establishment of health administration based on the new Public Health Ordinance, 1915, which came into force on January 1, 1917.

The executive local bodies in health matters were not created, and all the powers of local authorities were vested in the wardens. Early in the year I suggested the advisability of appointing small local boards composed of the warden, the medical officer

of Health and one or more prominent gentlemen resident in each district, who would undertake to interest themselves in public health matters. The suggestion was approved, but it was decided not to give effect to it until the new Administrative Divisions of the Colony were established as from January 1, 1919.

Central Board of Health.

The board held four meetings. The reports of two important committees were adopted, viz., one dealing with the question of the establishment of markets in populous centres in country districts, and the other with the no less important subject of latrine accommodation in rural districts.

Regulations were made by the Central Board of Health with regard to yellow fever and plague.

Health Officials.—The district medical officers who are *ex-officio* medical officers of health of their districts, on the whole did valuable work so far as their other onerous duties permitted, in promoting the enforcement of the Ordinance. Of course it is obvious that in some large districts medical officers have little time to devote to public health duties by reason of the extent of their districts and the exacting nature of their functions under the Immigration Ordinance.

Latrine Accommodation in Rural Districts.—The provision of sanitary conveniences in country districts was kept prominently in view during the year, and local authorities were asked to redouble their efforts to ensure that every dwelling in every village and in every estate should in a short time be provided with proper privies.

There has been a certain amount of improvement effected.

Drawings by the Public Works Department of plans of the cheapest types of privy cesspit were

considered and approved by the board on December 31, 1918, and the Secretary was directed to have copies prepared and issued to all local authorities in rural districts. It was also agreed to request the Director of Public Works and Medical Inspector of Health to draw up a circular with drawings to be issued to all owners and managers of estates describing two forms of latrines suitable for estates.

Dust Nuisance.—The oiling of all the streets in Port-of-Spain and of many of the country roads, especially in and near to villages, has reduced the dust nuisance considerably. The application of an oil floor dressing has also been extensively adopted in many Government offices, schools, stores, hospitals, &c.

The effects of the liberal use of oil in these ways must exert a beneficial effect on health conditions.

House Refuse.—In the course of the year 1917 I visited nearly every village of importance in the Colony, and was particularly struck by the unclean and insanitary condition of the streets and drains in most of them, produced by the dumping and scattering of rubbish. The need for the making of bye-laws dealing with the disposal of refuse seemed to be an urgent matter, especially in those villages in which there was a system of refuse removal at Government expense.

The questions of regulating the sale of fresh meat in rural districts and the providing of markets in populous centres were submitted to a Committee of the Board of Health. The Committee went thoroughly into the history of the country markets in Trinidad, and recommended that markets be not erected at present, but that places in which fresh meat is sold in future be licensed. It was decided by the Government to amend the Public Health Ordinance so as to give effect to the Committee's recommendations.

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ANNUAL REPORT FOR THE YEAR 1918.

By Colonel CATHCART GARNER,

Director-General.

INTRODUCTORY NOTE.

OWING to the various restrictive influences existing during the last four or five years, the annual reports of this Administration have been little more than collections of statistical tables embodying the information essential for future reference, and, as a result, they have been perhaps of little interest except to the public health expert and the statistician. It is, however, realized that public health is nowadays of such general interest that in the next report (1919) an attempt will be made to give a fuller account of the year's work and to go further into detail.

In order to maintain uniformity for comparative purposes with the reports of the last few years, the present report is drawn up for the calendar year, with the exception of the budgetary, staff, and stores figures; these refer to the financial year April 1 to March 31.

The strain of war conditions pertaining in 1915, 1916 and 1917 was not only not alleviated, but increased during 1918. The late Director-General of the Administration (Sir David Semple) left the service on April 7, 1918, and Dr. C. Goodman, Assistant Director-General, a most capable official, retired on May 1. Thus the Administration was

without either a Director-General or a Deputy Director-General, nor had the depleted staff of the years 1915, 1916 and 1917 received reinforcement.

It was apparent that this state of affairs could not continue, and the Acting Director-General drew up a note for the Adviser of the Ministry of the Interior and the High Commissioner, calling attention to the handicap laid upon the Department by the state of affairs as they then existed. It was explained that in order to keep abreast of the work continuous effort was necessary by day, and even until late into the evening, so that it became obvious that if one of the four senior technical officials (the Directors of Sections) fell ill, absolute collapse was imminent.

The epidemic of influenza, which appeared in a mild form in August, assumed a secondary severe wave in October, so the High Commissioner requested from the Commander-in-Chief the services of the former Deputy Director-General of the Department, who, since the beginning of the war, had been re-employed in the Army Medical Service; he was accordingly recalled to civilian duty with the Administration on November 21, 1918.

In the meantime a Commission had been nominated by the High Commissioner, and approved by the Council of Ministers, to advise as regards the future organization and work of the Department. The Commission was composed as follows:—

President.—Lieut.-Colonel Andrew Balfour, C.B., C.M.G., R.A.M.C.

Members.—Lieut.-Colonel G. E. F. Stammers, R.A.M.C.; Mr. E. S. Crispin, Director, Medical Department, Sudan Government; Mr. Charles Todd, O.B.E., Director of Laboratories, Public Health Department.

Secretary.—Mr. H. Sheridan.

Its terms of reference were:—

(1) To consider the present organization and duties of the Public Health Department, and its relations with such other Government Departments as are brought closely into touch with public health work.

(2) To put forward proposals for increasing the efficiency of the Public Health Department, without, however, going into the detailed working of the various Sections or Divisions of the Department, save in so far as this is necessary for a correct appreciation of the subjects under consideration.

(3) While the Commission will suggest the nature and number of the posts which in its opinion are necessary for the proper working of the Department, it is not empowered to make any recommendations as regards actual appointments to these posts.

(4) It is entitled to call whatever evidence it considers necessary for the purpose of its work, and will be given access to any papers, memoranda, records and reports which it desires to consult.

(5) It will submit a report on its findings to His Excellency the Prime Minister.

The Commission held its first meeting on May 29, 1918, sat for more than two months, and went most minutely into the existing condition of affairs,

examined witnesses both technical and non-technical, representing every branch of the Service having any bearing on the public health—in other words, practically every administration in the country—collected large masses of statistics, notes, reports, &c., and finally issued a well considered and deeply interesting report embodying a liberal and far-seeing scheme for the future development of public health work in this country; and expressing at the same time a unanimous opinion that the establishment of a Ministry of Health was necessary. The report aroused considerable interest, not only in this country but also in Europe, India, America, and other parts of the world, and it is hoped that in the near future an opportunity will be found to put into concrete form, if not all, at least a considerable portion of the more important proposals and recommendations made by the Commission.

Vital Statistics.—In the report on Section I will be found an explanation of the unusually high death-rate at Ismailia and Sinai (both these areas had been important military centres, involving a large aggregation of military and auxiliary forces), and also a note of the fact that the general birth-rate throughout the country shows a decrease and the death-rate an increase, as has been the experience of other countries during the war.

General Hospitals.—Twenty-one of the Administration's general hospitals were open for the admission of military cases, and from the commencement of the war to the end of the year under consideration 41,364 military patients, including prisoners of war, were admitted for treatment; of these, 20,106 were discharged as fit for duty, 11,429 were discharged to convalescent homes or camps, 1,533 were discharged to England, 6,333 were transferred to other hospitals, and 1,082 deaths occurred.

The total number of days of treatment of military patients was 716,500.

In addition to the above, 5,965 military patients were treated in Egyptian ophthalmic hospitals during the same period.

Maternity Schools, &c.—Five of the schools for native midwives (*dayas*) were kept open, and did most valuable work; these five were Zagazig, Mansûra, Minya, Sohag and Faiyûm. Owing to the difficulty of finding matrons for Shibin el Kôm and Damanhûr, the schools there had to be closed till the end of the year.

It is to be hoped that the Maternity Home and Nurses' Training School at Cairo can be reopened as soon as possible; the need for it is greatly felt in such a large city, and demands are constantly being made for the education of native women in this branch of public health work. Moreover, it is felt that such an establishment will afford an educational centre to combat the appalling infant mortality still prevailing in Egypt. The institution should comprise a lying-in hospital, mothers' and infants' welfare bureau, and school for instruction to Egyptian girls desirous of taking up the calling of nursing.

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Ophthalmic Hospitals.—The report on Section III (Ophthalmic Hospitals) is very brief, as a separate report is published on the work of this branch of the Administration.

Influenza.—The report on Section IV gives a history of the very severe influenza epidemic, which, commencing in a mild form in the summer, assumed a malignant character in the autumn. It is computed that altogether over 138,600 people died of the disease up to the end of the year.

The measures taken for combating the disease were the result of very careful and anxious consideration by a committee, the forerunner of a Permanent Consultative Board of Health which it is hoped to establish in the near future.

The action taken was on similar lines to that taken in the past for dealing with other epidemic diseases. The mode of infection and spread of the disease, instructions for avoiding it, and the measures to be adopted if attacked, as well as advice to those nursing patients, were described in simple language and brought to the notice of the public by means of posters, handbills, circular letters, &c.

A so-called "influenza vaccine" has been largely used in Europe and America both as a prophylactic and curative measure, and the question of its use in Egypt was very carefully considered.

It was agreed that no general application of the vaccine as a prophylactic measure was practicable on any large scale in Egypt, but arrangements were made whereby sufficient quantities of the vaccine were provided for the gratuitous use of poor patients in Government hospitals and in other hospitals where treatment was given free, and for use by medical officers of the Department for this class of patients when treated at home, if medical officers should be desirous of making a trial of it. A considerable supply of the vaccine was also procured and held by the Department for issue against payment to pharmacists and to medical practitioners for use amongst their private patients. Nevertheless, the use of this vaccine was not recommended.

Relapsing Fever.—The case incidence of relapsing fever showed an increase—12,642 cases being recorded, as against 11,162 in 1917; but the mortality rate fell to 6.6 per cent. in 1918, as compared with 9.3 per cent. for the preceding year.

Typhus.—The number of cases of typhus fever shows an increase—24,953, as against 18,569 in 1917. The provinces chiefly affected were Gharbiya, Beheira, Minufiya and Asyût. The mortality rate was also higher in 1918 than in 1917, the rates per cent. being 26.4 and 22.4 respectively.

Plague.—There was a marked fall both in the number of cases of plague and the mortality rate as compared with the previous year, the figures being 357 cases, with a mortality rate of 42.8 per cent. in 1918, and 732 cases, with a mortality rate of 54.5 per cent. in 1917.

Malaria.—The Anti-Malaria Commission instituted in 1917 continued its work, the Government granting a credit of L.E. 22,895 for the purpose.

In December this Commission forwarded to the Financial Adviser its preliminary report, which has since been printed in Arabic, English and French and distributed. The report is an interesting document, embodying the result of much work. Part I deals with:—

Malaria in Egypt.

Possible spread of malaria.

Breeding-places of anophelines.

Infiltration water.

Present measures and future developments.

Part II gives a description of the anti-malaria measures actually undertaken in the following specified centres and localities:—

The Suez Canal district.

The Oases of the Western Desert.

Cairo.

Cairo (Gezira).

Alexandria.

Provincial towns.

Agricultural districts.

The appendices consist of notes on various subjects: "The present state of knowledge with regard to sub-soil water in Egypt"; "Anti-malaria legislation" (suggesting the lines on which this should be drawn up); "Malaria cases reported in the country in 1917, 1916, 1915, 1914, 1913"; "Table showing the percentage of enlarged spleens in the population in different places in Egypt"; and finally a series of valuable and interesting diagrams and charts.

Cholera.—At one time during the year considerable anxiety was felt lest an extensive infection from Palestine should occur, due to the constant coming and going of men of the Egyptian Labour Corps, Camel Corps, &c. Several cases were in fact detected in these men returning to Egypt, but, as a result of the arrangements for detention of suspects, tracing of passengers, and their subsequent observation, together with the application of the necessary measures of disinfection and control, no case of infection in the interior of the country occurred. Fifteen cases in all were detected and hospitalized, six terminating fatally.

Of the 280,044 men who returned, only 8,579 escaped observation—in other words, 96.9 per cent. of these men were medically observed, disinfected, and traced on arrival at their destinations. All cases of diarrhoea were detained at the frontier and subjected to bacteriological examination.

A considerable amount of technical education for disinfectors, village barbers, &c., necessitated by methods now in vogue was carried out. Model cholera camps were established, one at Asyût in Upper Egypt, and another at Tanta in Lower Egypt, and used as centres for the lectures, practical demonstrations, &c.

Small-pox showed a decrease in the number of cases in 1918—1,196 against 1,567 in the previous year. The mortality rate remained practically the same.

Malta Fever.—Malta fever was kept within bounds, only thirty-three cases occurring during the year. Here, again, the public was instructed by

means of handbills and posters as to the method of spread of the disease and the measures for combating it.

Public Health Laboratories.—As pointed out in last year's report, the decentralization of the Army laboratories enabled the military authorities to take over practically the whole of the bacteriological diagnosis work of the Cairo area. This has allowed the public health laboratories to considerably extend the civilian diagnosis, more particularly in connection with epidemic service in the provinces.

The number of chemical examinations made for the military authorities during the year was 501, as compared with 335 during 1917. The total number of specimens examined in the laboratories during the year was 21,315, as compared with 15,105 in 1917.

Excluding the work done for the Army, the figures show a large increase, 20,649 specimens being examined during the year, as compared with 13,760 specimens during 1917.

Although it has not been possible to develop the water service, valuable notes and data on the water supplies and installations throughout the country have been collected, and the public supplies of Cairo submitted to a regular bacteriological control.

Central Medical Commission.—During the year under review the Central Medical Commission was detached from the Administration and attached to the Ministry of Finance. As, with the exception of the Cairo Commission, the whole of the Medical Commission work throughout the country is done by the medical officers of this Department, it is perhaps no matter for surprise that before the end of the year it was decided to re-transfer the Cairo Commission to the Public Health Administration.

The Medical Commission work continues to increase, the total number of examinations made amounting in 1918 to 18,546, as against 15,546 in 1917, and 12,960 in 1916.

Inspectorate of Pharmacies.—The number of pharmacists and assistant pharmacists available in the country is still altogether inadequate for the needs, and the enlargement of the Pharmacy School and an increased output of Egyptian dispensers is urgently called for.

Illicit traffic in narcotic and stimulating drugs is still persisted in, and is excessively difficult to detect. Cases have occurred of well-known and reputable firms in Europe forwarding considerable quantities of cocaine, morphine, &c., by post with sadly insufficient indications of the contents of the parcel. It is almost impossible to detect these cases.

The cocaine habit, it is regretted to record, is apparently on the increase amongst certain classes in Egypt.

The utmost vigilance continues to be exercised over the quality of imported drugs, and the report of the Inspectorate of Pharmacies contains some interesting reading in this respect.

Stores.—The budget for the supply of stores to meet the needs of the Administration continues to increase annually, the item for stores for the

Epidemic Section alone showing an increase of 100 per cent. The equipment for this branch of the work is based on an establishment sufficient for the treatment of 5,700 patients, with an emergency reserve for 1,000 patients in case of epidemics, nor can much hope of any decrease of expenditure in this section be looked for.

We are still suffering under the disability of insufficient storage space.

Scavenging and Watering Service.—Despite the continuance of war conditions and the difficulty of procuring material, 47,844 square metres extension of area was effected in 1918, making up a total area of public roads in charge of the Service for scavenging and watering of 3,224,590 square metres, and involving an increased water consumption of 40,000 cubic metres. By the exercise of the most rigid economy the increased total cost of the Service was kept down to something under L.E. 6,000.

Table LXV gives a list of the legal enactments which the Administration is called upon to apply, together with details of the prosecutions instituted under them in 1917 and 1918. The list is a long one, but an examination will disclose several important lacunæ, particularly with reference to food and drink, drainage, and other matters, which it will be the duty of the Public Health Administration to fill up and adjust. In addition, experience has shown that many of the existing laws are defective and need re-drafting and modification. The appointment of a special legal adviser and draughtsman for this Department is very much to be desired.

The budget for the financial year April 1, 1918, to March 31, 1919, showed an increase over that for the financial year 1917-1918 of L.E. 70,972. The main items of increase were: Salaries, wages, and allowances, L.E. 16,048; food, L.E. 36,912; and stores, L.E. 6,834.

The staff was also increased from 582 pensionable officials and 305 temporary employees in 1917 to 632 and 343 respectively in 1918. The lower grades of staff numbered 1,673 in 1918, as against 1,634 in 1917.

In accordance with the general principle of centralizing in the hands of the State Buildings Department of the Ministry of Public Works, all building operations and repairs to Government buildings, the staff and credits hitherto existing in the Department's budget for new buildings, repairs and maintenance of its existing buildings were transferred to the budget of the Ministry of Public Works from the beginning of the present financial year (April 1, 1918). The report on the Engineering Branch, which has hitherto been included in the Department Report, is therefore omitted this year, as the details of the building work and repairs will be embodied in the report of the State Buildings Department, and the other work done by the Engineering Branch is incorporated in the reports on the work of the various Sections of the Administration for which it is done. The working arrangement arrived at between this

Department and the State Buildings Department is embodied in Departmental Order No. 82, which was published on October 15, 1918.

VITAL STATISTICS.

With reference to the statistical information, it is to be noted that this year the Statistical Department of the Ministry of Finance has abandoned the practice which has obtained for some years past of showing separately for Egyptians and foreigners the figures for the estimated population, birth-rate and death-rate. The reasons given are that the instability of the European population, and the fact that in the case of many Europeans normally resident in Egypt, the births of their children and the deaths of members of their families frequently occur abroad, and are consequently not always recorded in the Egyptian registers, rendered the calculations so unreliable as to be unworthy of placing on record separately.

The high birth-rate at Ismailia, and the extremely high death-rate at Ismailia and in Sinai, are explained by the fact that during the war these areas were both important military centres where a large number of Egyptians engaged in auxiliary services connected with the Army were congregated. The births and deaths which occurred amongst them were registered in the locality, and consequently calculated against the relatively small population based on the census figures. El Arish (Sinai) was also used as the registration centre for all deaths occurring in the Egyptian Labour Corps and Camel Corps in Palestine and Syria.

In Egypt, as in other countries, as the result of the events of the last year or two, the birth-rate shows a decrease and the death-rate an increase in comparison with the pre-war rates.

An *Arrêté* for preventing the pollution of drinking water at Rosetta was promulgated during the year.

No new slaughter-houses were established in the country during 1918.

Sites for slaughtering animals intended for food in villages where no slaughter-houses exist were approved in four villages.

A *dépotoir* at Suez was approved by the Department during 1918.

The number of prostitutes registered last year (6,523), and the total number of examinations made (185,140), shows very little difference as compared with the 1918 figures, but this year there was a large increase in the amount of gonorrhœa found as compared with last year (5,599 cases, as against 3,583). The number of prostitutes treated in Government hospitals in 1917 (5,625) and the cases of gonorrhœa were very much fewer than in 1918.

GENERAL HOSPITALS.

Hospitalization for Military Patients.

During the year 1918 Suez Hospital was retained for the treatment of military cases, while the old hospital continued to be used for native cases.

The other general hospitals admitted cases sporadically as they were required; for the most part these cases were natives, usually Army contractors' workmen, though Port Saïd Hospital continued the arrangement with the French Military and Naval Authorities for the admission of sick and wounded.

In March, 1918, the Director of Medical Services, on the suggestion of this Administration, asked that a camp should be erected to serve as a hospital for the discharged Egyptian Labour Corps men. This camp was immediately equipped and erected at Zagazig with tents to accommodate 200 beds. Later (in November) this number was increased to 350 beds.

During the nine months' work the camp has admitted and treated 2,464 cases, with 408 deaths. This rather large death-rate is due to the debilitated condition of the men on admission, many dying on the way or the day after their arrival.

The total number of military cases treated in the Egyptian Government hospitals for the year 1918 was 8,532, while the total number treated since the outbreak of hostilities was 41,364.

As was predicted in the report for 1917, the charge to the Military Authorities per diem for treatment of men in hospital had to be raised to P.T. 25 owing to the increased price of food and drugs.

General Statistics and Notes.

The number of beds is 4,543, compared with 3,872 in 1917—an increase of 671 beds. This is due to the beds at Zagazig, Egyptian Labour Corps camp, and to the large increase in the number of in-patients treated in general hospitals during this year.

A marked rise in the number of voluntary cases treated also is shown.

The number of days of treatment for 1918 was 1,117,791, as compared with 871,228 in 1917, an increase of 246,563.

The number of out-patients treated this year has increased by 5,508.

The average death-rate for all in-patients (military and civilian) was 6.946 per cent. in 1918 and 5.709 per cent. in 1917. This high death-rate is due to the number of cases sent to the Egyptian Labour Corps camp who died on day of arrival or shortly afterwards, and owing to the influenza epidemic.

The electric generating plant at Benha Hospital, provided for by local subscription, was fitted with an X-ray apparatus.

The inhabitants of Minya subscribed L.E. 400 for an X-ray plant and electric lighting for the hospital. The necessary engine and dynamo were purchased.

The Provincial Council of Minûfiya has notified its desire to provide an X-ray plant and also a venereal clinic for the hospital at Shibin el Kôm; the Administration fully appreciated this goodwill on the part of the Council, and it is hoped that the necessary installation will be made without delay.

It is very satisfactory to note that this year second medical officers were appointed to Minya, Shibin el Kôm, Beni Suef, and Faiyûm Hospitals, and that next year will see second medical officers working at all the hospitals except the small hospitals of Aswân, Isna, Qalyûb and Damietta. Also a matron and nursing sister have been appointed to Tanta Hospital, and it is hoped that in 1919 similar posts will be filled at Mansûra and Suef. There is no doubt that with this extra medical assistance and improved nursing control the comfort and welfare of the patients will be considerably increased, and it is hoped that more time will be available for the study and report upon diseases peculiar to Egypt on the part of medical officers in charge of hospitals.

New Works and Repairs.

It should be noted that amongst the new works most desired for the provincial hospitals are venereal clinics with accommodation for the isolation of prostitutes, infectious blocks for the treatment of infectious diseases, and suitable out-patient buildings to meet the expected large increase of this class of patients. Moreover, should the policy of providing matrons for these hospitals in annually increasing numbers be approved, necessary quarters will have to be provided.

CHILDREN'S DISPENSARIES.

The twelve Provincial Council dispensaries inspected by the Department have worked during the full year with good attendances.

Port Said.—The dispensary has been housed in a private house, the military still utilizing the dispensary building as a native boys' school.

Asyût.—The dispensary moved in May into the new building, which has been specially built with accommodation for a maternity school as well. It is well situated on the edge of the town, and, being designed for the work, is a great improvement on the hired building previously occupied.

Great difficulty has been experienced in finding suitable nurses at short notice to replace matrons during sickness and for short leave. The appointment of some nurses attached to headquarters of the Public Health Administration, who will be available for duty in the provinces when required, will be of the greatest assistance for the continuity of the work.

In spite of the higher cost of material there has been very little increase in the budgets for the year.

The drugs ordered from abroad through the Department of Public Health and due in April did not arrive, so small quantities were bought locally to keep the work going till the supplies, which were estimated as the quantity needed for a year, should arrive.

At Zagazig, Port Said, Minya and Asyût private practitioners have kindly given their services, but at the other dispensaries serious cases are sent to Government hospitals for advice and treatment.

Attendances were slightly less than the preceding

year; this is accounted for by the influenza epidemic, when mothers were unable to bring their children.

Five of the schools for native midwives (*dayas*) were working during the year—Zagazig, Mansûra, Minya, Sôhag and Faiyûm; owing to the difficulty in finding suitable matrons, those at Shibin el Kôm and Damanhûr were closed until the end of the year. The new school at Damanhûr was opened in November, and work is progressing satisfactorily.

The school at Tanta, which is not at present under the inspection of the Public Health Administration, has been closed since June, 1917.

Maternity centres exist at present at Asyût and Beni Suef, but the Provincial Councils in these towns are unable to find funds to start the work. There is no change in the housing of the schools.

Three matrons were engaged in England, and commenced work in the autumn. Owing to the difficulty of finding nurses the schools have had to be closed during the leave or sickness of the matrons in charge, with the result that interruption and even cessation of this most useful work occurred.

As in past years, invaluable help has been given by the principal medical officers and assistant doctors of the hospitals and Markazes. Private practitioners frequently give their help in cases of emergency. Courses of lectures to the *dayas*, to supplement those given by the matrons, are of great assistance, and instruction at the school in infectious diseases and examination of the dead obviates the necessity of the pupils attending the course given by the *mumarrida* at the Government hospital in these subjects, and is of great benefit to those who already hold the certificates, but who are in need of "refresher" courses.

Encouraging reports continue to come in from Markaz doctors, who have the opportunity of seeing the trained women at work in the districts, and they speak most favourably of the improvement.

The difficulty in getting cases for teaching purposes is gradually being overcome, from twenty to seventy cases a month being attended by the matron and pupils. Though there is still an obstructive element among the town *dayas*, the majority work well with the school, seek the help of the matron in difficult cases, and are gradually learning to recognize when to call in help. The patients themselves also appreciate the benefits of the modern methods, and many applications are made to the matrons without the intervention of a *daya*. There are many calls from better-class patients willing to pay a fee, but as the work among the poor is as much as one matron can attend to, and the school accepts no money from the patients, these have to be referred to the hospital *mumarrida* or a trained town *daya*.

Though the maternity centres are not equipped as hospitals, and are essentially for extern work, thirty-five women have applied for admission and been treated in the emergency bed provided at each school.

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The visits of the matrons and *dayas* to the patients in their own homes numbered 25,355, and, owing to the freedom of access to the people's houses, centres of infectious diseases are frequently recognized in the early stages, thus lessening the danger of extended outbreaks or epidemics, saving the lives of the neighbours, and obviating much expense to the Treasury.

The standard of pupils continues to be as good as it can be expected to obtain from uneducated *fellahin*. Town *dayas*, who are inspected when possible, are advised to send their daughters, or whatever relative is likely to succeed to their practice, to school, as the standard of candidates cannot be raised until those who enter have had at least some preliminary training. With this in view, several women have been assisted with clothing, &c., needed to enable their daughters to attend the Provincial Councils schools.

A considerable number of more educated women from Cairo, Alexandria, and Port Said apply for training as midwives, but as there is no central training centre no help can be given them. Through the courtesy of the Provincial Councils a very few have been allowed to take the four months' course at the Provincial Councils schools. This class of midwife is needed to fill the post of staff *daya* in the schools and work among the people who can pay a moderate fee, and would-be pupils at the women's hospital and maternity at Cairo were one established.

The need for inspection after training becomes more urgent yearly, as the number granted certificates increases, and great benefit is anticipated from the appointment of travelling nurses.

The number of pupils trained during the year was 116, as compared with 147 in 1917 and 130 in 1916, while three entered but failed to pass the examination.

Medical.

The number of cases attended during 1918 was 1,845; of these, 156 were abnormal. The epidemic of influenza at the end of the year was the cause of many cases of pneumonia and premature confinements among the patients. As many cases also occurred among the various staffs, great difficulty was experienced in carrying on the work.

It is hoped that the need for a central maternity hospital with general training school for *dayas* and nurses in Cairo has become so apparent, and the advantages to the population so obvious, that the disinclination on the part of the Financial Authority to provide funds for the installation of such an institution will be removed.

OPHTHALMIC HOSPITALS.

These hospitals, forming the subject of a separate annual report, the outlines only of the work done by them will be given here.

Permanent Hospitals.—During the last ten years ten of the fourteen provinces of Egypt have been

supplied with a well-designed and well-built ophthalmic hospital, each of which was built and equipped at the expense (except Tanta) of the province concerned, and is maintained by the Government at a pre-war cost of L.E. 1,500 per annum inclusive. Also a permanent hospital is in course of construction at Benha at the expense of Qalyûbiya Province, and is expected to be opened and maintained by the Government in 1920. In addition, the Provincial Council of the large province of Gharbiya has provided and now maintains ophthalmic dispensaries in specially designed buildings at three of the larger towns.

Hospitals under Canvas.—Stationary hospitals under canvas are maintained by the Government* at Aswân and Giza, the first of which was originally provided by Sir Ernest Cassel, and the latter was provided by the Provincial Council of Giza Province. One Cassel Fund travelling hospital is maintained by the Government, and two smaller travelling hospitals are maintained by the Provincial Councils of Daqahliya and Asyût.

Statistics.—The number of new patients treated at the various hospitals in 1918 was 82,316. The total number of attendances of out-patients was 1,013,282. The average number of visits of each patient was 12.20. The number of operations performed was 54,277. The number of in-patients was 3,264, to whom 66,442 diets were issued.

School Inspection and Treatment.—The school ophthalmic clinics at eleven of the Government provincial primary schools have been carried on during the year 1917-1918 satisfactorily.

INFECTIOUS DISEASES.

The chief features to be noted in connection with epidemic diseases in Egypt during 1918 are:—

(a) The appearance in the latter half of the year of influenza in severe and widespread form, part of the pandemic of this disease.

(b) The continuance of the menace of the introduction of cholera from Palestine.

(c) A large incidence of typhus and relapsing fevers.

(d) A notable decrease in the incidence of plague cases as compared with 1916 and 1917.

(a) Influenza.

The disease existed in very mild form in the principal towns of Egypt between May and August (inclusive), 1918, without influencing the general death-rate. In September it assumed a more malignant character; numerous epidemics with a high death-rate then occurred all over the country. This wave reached its climax early in December, and by the end of that month was declining sensibly.

The disease first appeared in this country in

* Two tent hospitals were provided in 1903 and 1904 by Sir Ernest Cassel and are maintained from the interest of the sum of L.E. 40,000 given by him for the purpose.

May, 1918, in Alexandria. It was imported from Europe by sea.

Its presence was recognized in Port Said in June; it was imported there, too, by sea.

In Cairo the disease appeared in July in mild form.

In August it was reported in the province of Daqahliya. Till the end of that month (August, 1918) it had not caused any appreciable increase in the death-rate of the civil population. In September cases with pulmonary complications began to appear in those places mainly where the presence of the disease had already been recognized.

Scattered outbreaks of the disease, with a high rate of pulmonary complication and high death-rate, appeared in the same month in the provinces of Minūfiya and Gharbiya in Lower Egypt, and Girga and Asyūt in Upper Egypt.

In October the disease spread quickly over the whole country, the frequency of pulmonary complication and the death-rate increasing rapidly. In November the disease penetrated into every nook and corner of the country. In the first week of December it reached its zenith.

Thus there was no sharp division into two waves of the disease, though there were these two distinct periods:—

First Period.—From May to August inclusive, when, as stated, it appeared in Cairo, Alexandria, Port Said, and Daqahliya Province as an epidemic of cases of a mild fever lasting a few days and causing no appreciable rise in the death-rate. In this period the exact curve followed by the disease was obscured by the co-existing epidemic of typhus and relapsing fever which appears annually in Egypt in the early spring, reaches its zenith at the end of June, and dies down in August.

Second Period.—From September, and still continuing at the end of December, in which the disease showed a rising rate of pulmonary complication and death from September to the first part of December, 1918, and then started to decline.

The itinerary of the disease was as follows: May, 1918, Alexandria; June, 1918, Port Said; July, 1918, Cairo; August, 1918, Daqahliya; September, 1918, Provinces of Minūfiya, Gharbiya, Qalyūbiya, Giza, Asyūt, and Beni Suef; October, 1918, all Egyptian provinces; November, 1918, Sinai Peninsula, Oases of Baharia, Dakhla, and Kharga; December, 1918, stations in the Eastern Desert.

The disease was certainly introduced from Europe by sea.

It was prevalent to a considerable extent in the British Army (the E.E.F.) both in Egypt and Palestine, before it manifested itself to any extent in the civil population of Egypt. Communication between the Army and the native population was rendered very free by the existence of a Labour Corps of Egyptian *fellahin* of considerable strength recruited on a six months' basis.

It spread rapidly in Lower Egypt, where communication by road, railway and river is extremely free. In Upper Egypt the larger towns on the line of railway running from Cairo to Aswān were,

generally speaking, first attacked, and from them it spread by road communication to the villages.

There were no zones unattacked except certain small stations on the Red Sea.

The great majority of the 4,059 towns and villages of Egypt were attacked.

At the time of origin of the epidemic in Egypt communication with Turkey did not exist, and the available evidence, in so far as concerns India at least, is that that country was infected certainly not earlier than Egypt.

In the villages of Egypt the spread of the disease was probably promoted by the great frequency with which fairs are held. In the large villages those are held weekly, and draw large numbers of people from the surrounding villages.

Pilgrimages did not enter into the spread of this epidemic in or to Egypt. The disease was not observed in the Mecca Pilgrimage of 1918 by the members of the staff of this Department who did duty with the pilgrims. The pilgrimage took place in September, and the disease had appeared before the departure of the pilgrims and had assumed the character of a severe epidemic before their return.

Military movement played a part in the dissemination of the disease, chiefly as the channel of import. The part played by the existence of the Egyptian Labour Corps has already been noted. This Corps was recruited from the labouring classes in all towns and villages in Egypt, and as the period of service was six months a large amount of movement took place between the Army in Palestine, on the Canal, and in Egypt and the Egyptian towns and villages.

That the first cases should have occurred in the Army was natural, as the communication between Europe and Egypt at the time was practically entirely in the nature of military movement.

As explained above, there was no very marked division into distinct waves, except in the case of the town of Port Said. There a wave of a very mild form of the disease occurred in June, July and August, followed by a severe high mortality outbreak in October and November; sporadic cases occurred in the interval.

In the case of the other large towns where it was known to exist between May and September, it took the form during that period of a number of mild cases, with no definitely established interval of separation between the commencement and the time in September when it began to assume the form of an epidemic with considerable mortality.

In September it simultaneously appeared in a considerable number of scattered points, showing the same severe type; where the points were rural districts it is not known whether the outbreaks were preceded by mild cases.

There seems every reason to believe that the disease as seen from September onwards was an aggravated type of that which had been present before, and was not a re-infection. For while the type generally suddenly became more serious owing to the occurrence of pulmonary complication, yet in all outbreaks until the disappearance of the

disease mild cases continued to be seen such as constituted the only type met with in the early months, May to August.

The total number of cases is not known. It must be remembered that, in the case of acute medical disease in this country, the populace, as a whole, even in the large towns, still shows little tendency to seek early medical aid. In the country districts hospitals exist, as a rule, only in the chief towns of provinces, and the proportion of medical officers to the populace is in many cases not more than 1 to 100,000. Causes of death are certified by an inspection of the body in that large percentage of cases where the patient has not been seen by a doctor during life. In large towns this is carried out by the Government medical officer, in villages by the sanitary barbers.

The total excess of deaths from September, 1918, to December, 1918, over the average for that period for the preceding two years was 138,648. It may be presumed, as there was no notable prevalence of any other infectious disease, that this total represents roughly the total number of deaths from the disease.

It is difficult, of course, to fix the exact death-rate in the case of a disease presenting so many slight types, but in the village outbreaks in which it was possible to study the death-rate it was found from September, 1918, to December, 1918, to be about 25 per cent.

The death-rate in the Cairo hospital of the Government and the prisons was:—

	Hospital Per cent.	Prisons Per cent.
From May to August, 1918	1.03	2.07
From September, 1918 to December, 1918	6.68	

For reasons given above, it is impossible to give any approximate estimate of the number of cases of, or deaths from, pneumonic complications. Statistics for the more severe period of the epidemic show that the larger towns suffered much less severely than the smaller towns and villages.

The lower classes suffered much more severely than the more prosperous, less-crowded, and better-housed classes.

Analysis of the death returns shows that the disease caused the largest number of deaths above the average in the case of the age periods from 10 to 20. With regard to sex, it was not found that this exercised any effect on mortality.

The number of cases which occurred in the prisons was 2,489; the deaths totalled sixty-seven.

Clinical and bacteriological features of infectious disease are not dealt with, as a rule, in this report. It may be said, however, that in these respects the disease showed no important variation from the type as met with in other countries.

Two circulars for public use were prepared and published in five languages (English, French, Arabic, Italian and Greek).

(1) On the personal precautions to be taken to avoid the disease and to avoid complications when attacked.

(2) On the necessity of free ventilation.

Copies of the two circulars:—

AVIS OFFICIEL.

INFLUENZA OR "SPANISH FEVER" CAN BE AVOIDED.

It is caught by breathing directly the poison breathed out by a person sick of the disease. The sick do not always appear to be ill. You will know the disease by the following symptoms: headache, sore throat, discharge from the nose, cough, pains in the body and limbs, and fever.

FOLLOW THESE RULES:—

(1) To avoid the Disease.

Avoid breathing the breath of other people.

Avoid all crowds in closed spaces, and especially ill-ventilated theatres and cinemas.

Avoid crowded trains and trams—walk whenever possible.

Do not attend any festivities or death wakes.

Keep your windows open; fresh air and sunlight kill the germ.

Ask for a clean mosquito net when you stay in an hotel.

Do not use a towel used by other people.

Do not use cups or glasses or forks or spoons used by other people unless you know that they have been well washed. Therefore, shun bars and restaurants, unless you are satisfied that these things are properly washed therein.

(2) If you are attacked by the Disease.

Try not to spread it; this is a duty.

Go to bed and stay there till two days after you think you are well.

See no visitors. Allow only one person to look after you.

Every time you cough or sneeze, cover the nose and mouth, preferably with a handkerchief, otherwise with your hand. If you do not, you will infect anyone near you. This rule should also be followed by those who are well.

Spit into a handkerchief and have it boiled, or into rags and have them burned.

Keep your windows open and cover yourself well with blankets.

(3) If you have to nurse a Patient.

Avoid the patient's breath and do not kiss the patient.

Do what you have to do for the patient and then keep at a distance.

Do not sit by the patient all day.

Allow no visitors.

Boil the handkerchief or burn the rags into which the patient spits.

You can protect yourself by wearing a mask of thick gauze over the nose and mouth. Boil this three times a day.

Boil the patient's face towel once a day.

Boil the patient's cup and spoons and forks after each time of using.

MINISTRY OF THE INTERIOR.

DEPARTMENT OF PUBLIC HEALTH.

Precautions against the Spread of Influenza, or "Spanish Fever," in Places where People are congregated together.

Influenza, a highly infectious disease, is contracted by one individual directly inhaling infected material sprayed into the air from the nose, throat or lungs of an infected person, especially by the acts of talking, coughing and sneezing. This method naturally operates chiefly in places where large numbers of people are aggregated together in closed spaces. Where such collections of people are unavoidable, as, for example, in large warehouses and shops, offices, churches, mosques, schools, convents, restaurants, courts of justice, &c., the danger may to some extent be obviated by taking steps to ensure free and continuous ventilation by keeping all doors and windows open.

In schools, the intervals between the classes should be used to the fullest advantage for ventilating the rooms, and the reciting of lessons in unison by the scholars should be discontinued for the duration of the epidemic.

In view of the approaching cold weather, it must be noted that in the present circumstances there is infinitely more danger from an unventilated atmosphere than from a current of cool, pure air.

In the case of schools, offices, shops, &c., persons showing any symptoms of the disease (headache, sore throat, discharge from the nose, cough, pains in various parts of the body, and fever) should not be allowed to remain at their duties.

Both these circulars were inserted in the press, and the press was asked to draw attention to them. The circular on personal precautions was posted all over the country as a poster in every conceivable place. It was scattered broadcast as a handbill; it was read regularly in mosques and churches; and religious teachers everywhere were asked to impress the various points on their hearers.

The ventilation circular was sent to all persons controlling places in which considerable numbers of people were aggregated.

At the same time all railway and tram companies were communicated with to arrange for the regular airing and ventilation of their vehicles.

The fullest possible ventilation of all cinemas, theatres, &c., was insisted on.

The Closure of Schools was enforced in the case of Government schools and recommended in the case of private European schools, according to the following lines:—

Schools serving Local Needs.—Remained open unless the sickness rate therein exceeded the general sickness rate of the locality, as the pupils attending such schools were merely sample units of the local population, and the danger of infection to the individual scholar attending such a school from association with persons within the school could not possibly be any greater than would result from a similar degree of intercourse outside.

Schools serving Particular Classes of the Population and Drawing their Pupils from widely scattered Localities.—These had a tendency obviously, by the daily centralization and redispersion of the pupils, to scatter and encourage the spread of the disease. They were therefore converted into schools of the category described under paragraph 1 by the exclusion of the pupils coming from a distance. Where this could not be done they were closed.

Boarding Schools.—These were not closed, either when infected or non-infected, because in the first case the dispersal of the pupils would have spread the infection to the outside general population, and in the second case closure would have been disadvantageous, as it would have meant the removal of the pupils from the area free from infection and their dispersal into probably infected areas, where they might be exposed to less favourable conditions of life than would be the case if they remained in school. Boarders were not allowed to go home at week-ends.

Mixed Day and Boarding Schools.—These schools were converted into the category described under paragraph 1 by the exclusion of day pupils coming from a distance. Boarders were not interfered with, except that they were not allowed to go home at week-ends unless their homes were within the radius from which day scholars were allowed to attend.

Kuttabs, i.e., Elementary Village Schools.—Government *kuttabs* and Government-inspected *kuttabs*, if passed by the Ministry of Education as sanitary, were allowed to remain open. Other *kuttabs* were closed on account of their generally overcrowded and insanitary condition.

Higher Schools and Colleges.—These and other schools under the Department of Technical Education were allowed to remain open. In the majority of cases the students were adults, and their condition is comparable to that of any collection of persons earning their living.

Al Azhar (the Moslem University) and other similar Educational Institutions.—Owing to the generally crowded conditions under which the students live, and to the fact that at short intervals large numbers of these students drawn from widely spread areas make journeys to their homes, these institutions were closed temporarily.

Cinemas, &c.—The anomalous position in respect of legal powers vis-à-vis Europeans would have made it very difficult to arrange for the closing of cinemas. But the fullest ventilation of all theatres and cinemas was insisted on. The granting of licences for travelling theatres was suspended.

Restriction of Movement and Prevention of Crowds.—All funeral celebrations were stopped, an important factor in Moslem countries. The sitting of village tribunals and recruiting operations for the Egyptian Army were temporarily suspended.

No restriction of movement was practised at any of the Egyptian frontiers. In the opinion of this administration such a measure would have been useless.

Colonial Medical Reports.—No. 126.—Egypt (continued).

The general public and the press manifested considerable interest in the propaganda, and the impression is that the steps taken were of considerable value in curtailing the epidemic. Such closure of meeting-places as was enforced certainly did not succeed in stopping the march of the epidemic. It did, however, in my opinion, help to curtail its ravages.

The use of masks by the *personnel* of the Government hospital engaged in nursing influenza cases was ordered. It is difficult to say in the case of native *personnel* of lower grade how far this order was carried out; where it was carried out the impression is held that the results were beneficial, though, of course, in the middle of a widespread epidemic the chances of infection are so great that it is difficult to assess the value of any one preventive measure.

No drug has been found to be of value as a preventive.

Vaccination.—The Department provided itself with a considerable quantity of prophylactic and curative vaccine. It advised the medical profession and pharmacists of this fact, and placed this vaccine at their disposal at cost price. Prophylactic anti-catarrhal vaccine and therapeutic mixed vaccine: little use was made of this vaccine by the outside public. The Department caused all its staff working in hospitals in connection with influenza to be vaccinated against influenza; the facts that the numbers involved are small, and that a certain number of those vaccinated had already been attacked before this was done, would make any deductions from the apparent results unreliable.

Isolation as a method of limiting the disease was considered, but it was not adopted.

The medical officers of the Department received circulars of instructions embodying all the measures described above.

The help of the organization of the Ministry of the Interior was invoked, as in cholera epidemics, to assist in providing the action necessary on the lines indicated above.

Meetings of the head men of all villages all over the country were held; the nature of the disease and steps necessary to its curtailment were explained to them.

In addition, special sanitary inspectors were sent out to heavily infected villages; they were charged with the following duties:—

(1) To see that the posters and handbills of personal precautions had been received, and that every method was being followed to make their contents known.

(2) To arrange for voluntary isolation in some large airy house lent by the notables of cases which could not be suitably isolated in their own houses.

(3) To arrange the loan of Government clothing and blankets in necessitous cases.

Organization of Medical Assistance.—It should be explained that in all Governorate towns (Suez,

Cairo, Port Said, Alexandria and Damietta) and in the chief towns of all Mudiriyas or provinces (total, fourteen) there are Government hospitals.

In the sub-divisions of Governorates or Markazes (eighty in all) there is stationed, in every case, a Government medical officer (in some cases two). There is in each Markaz a Government dispensary where no private pharmacy exists; there are in a few instances in Markaz towns Government hospitals as well.

In Government hospitals in the provinces special wards were set aside for the treatment of poor influenza cases, and the second medical officers of the hospitals were entrusted with the free treatment of poor cases in their houses.

In addition to this, all Markaz medical officers were instructed to treat poor cases in their houses gratuitously and to offer them drugs free. Special medical officers were also delegated from Central Administration to places heavily infected for the purpose of administering this free treatment.

In addition to the above measures, special influenza hospitals were put up in places, wherein the disease was most widely spread, for the free treatment of poor influenza cases who desired such treatment.

The drug, the use of which was considered to have given the greatest success in the treatment of cases with pulmonary complication, was cacodylate of guaiacol.

(b) Relapsing Fever.

The total number of cases of this disease notified during the year was 12,642; the death-rate was 6.6 per cent. This death-rate is 2.2 per cent. lower than the average of the three previous years. This is due to the fact that a considerable number of cases of influenza were diagnosed and returned as relapsing fever. This mistake occurred largely in the country districts, where the occurrence of influenza in widespread form from September to December threw a most considerable strain on the Markaz doctors. Owing to the war the Department was then working considerably under strength. The probability of this confusion was foreseen, and every endeavour was made to obtain as exact diagnosis as possible. Blood examinations were carried out wherever feasible, but a considerable error undoubtedly crept in.

The occurrence of the large amount of the disease recorded was due to a continuance of those special war conditions which caused the large epidemics of the two previous years. The disease was uniformly spread over the country, the large towns, the ports, and the villages all suffering.

(c) Typhus Fever.

The number of cases scheduled (42,953) is the second largest on record. But, as in the case of relapsing fever, a considerable error occurred from faulty diagnosis owing to the outbreak of influenza. An attempt was made to limit this error by insist-

ing on the carrying out of the Weil-Felix test wherever circumstances permitted. The amount of this error is indicated by the fact that in 1918 0.09 of the total number of cases were notified in the period September to December, while in the three previous years the average for this period was 0.04.

The remarks made above as to relapsing fever, with reference to distribution and cause of the high incidence, apply to this disease.

(d) *Plague.*

The total number of declared cases of plague in 1918 was 357.

The number of deaths was 153, showing a mortality of 42.8 per cent.

Of the 357 cases referred to, 306 cases were of the bubonic, seventeen of the septicæmic, and thirty-four of the pneumonic type.

(e) *Malaria.*

The number of cases of the disease which have come under the notice of the Administration during the year 1918 is 2,536.

The Malaria Commission alluded to in last year's report continued its work throughout this year on the lines described. This Commission is engaged in drawing up a preliminary note on malaria in Egypt.

(f) *Cholera.*

The menace of importation of the disease from Palestine referred to in the reports of the two previous years existed during 1918, especially in the early months. In order to co-ordinate the efforts of those concerned in its exclusion, a Civil and Military Commission was constituted. On this Commission the International Quarantine Board, the Military Medical Authorities, and the Department were represented.

The chief matters dealt with by the Commission were:—

(1) The measures necessary to prevent the importation of the disease by native levies in Army employment and by prisoners of war.

(2) The modification of maritime quarantine measures rendered necessary by military considerations.

Measures in connection with native levies:—

(a) The Egyptian Labour Corps during this year reached a very considerable strength. They were largely employed east of the Suez Canal. Their recruitment continued as before on a basis of a few months' service, and there was therefore a continuance during 1918 of the need for the sanitary control of these labourers on their return to Egypt which was first established in 1917.

The successful invasion of Palestine which took place at the end of 1917 involved the occupation of territory in which cholera had existed in the civil population.

Several cases of cholera in the person of return-

ing Egyptian Labour Corps labourers were detected in Egypt late in December, 1917, by the system of address-taking then in vogue. This system was therefore reinforced by the imposition of a period of five days' quarantine and disinfection at Kantara and Port Said for all Egyptian levies before returning to Egypt. All cases of diarrhoea were subjected to bacteriological examination. These measures were administered by the A.D.M.S., Egyptian hospitals; the Department lent medical and subordinate staff to reinforce Army personnel.

Seven cases were discovered by this system, all at Port Said.

In addition, legal powers were obtained to compel all local subjects leaving Kantara to give their addresses and submit to medical observation at their destinations.

By the exercise of this passenger control many cases of typhus and relapsing fever were incidentally discovered and isolated early.

(b) The Commission arranged with D.M.S., E.E.F., that all Egyptians recruited for the Labour Corps should be vaccinated against cholera. The first dose was given by the Departmental Markaz medical officer on the occasion of the first medical examination, the second dose at the Corps Dépôt at Kantara by medical officers lent to the Army by this Administration for this purpose.

Prisoners of war were carefully segregated for ten days by the Army after capture. All cases of diarrhoea occurring during this quarantine were bacteriologically examined.

The bacteriologists of the Army Medical Service and of this Administration kept in close touch, with the object of exchanging specimens of all vibrios found, and of unifying their methods of diagnosis as far as possible.

The institution of this Commission proved, from the point of view of the Department, of the greatest utility.

With regard to the strictly departmental work in cholera, a revised edition of the cholera handbook, laying down the measures to be taken for the detection and suppression of this disease, was issued during the year.

In view of the fact that new methods of treatment, disinfection, and water sterilization had been evolved since the country was last seriously threatened with the disease, it was thought advisable that all the Departmental disinfectors and selected intelligent village barbers (about 150 in number) from all over the country should be trained practically in these methods. Two schools were established, one at Asyût in Upper Egypt and the other at Tanta in Lower Egypt.

Model cholera camps were established at these places, lectures and demonstrations were given on disinfection, elementary treatment by Roger's method, management of village outbreaks, including purification of wells and methods of ensuring uncontaminated supplies from canals, methods of distributing literature laying down precautions for the public, &c.

(g) Small-pox.

The number of cases reported during 1918 is the lowest during the last ten years, viz., 1,198 cases with 306 deaths; percentage death-rate, 26.4.

(h) Malta Fever.

Thirty-four cases were notified in Egypt during the year.

Thirteen cases of these occurred in Port Said, where goats' milk forms the only available supply.

The following steps were taken to limit the spread of the disease in that town. The public were informed, through the press and the use of a handbill and poster, of the method by which the disease is normally contracted, and were advised to boil all milk used. All milk vendors were registered by an order issued under martial law, and owners of public establishments such as restaurants were warned to boil all milk used by them. These establishments were inspected to ensure that this was carried out, and where any neglect was met with the establishment was put "out of bounds" to troops.

PILGRIMAGE.

Owing largely to war conditions, including difficulty in providing shipping, only 464 persons proceeded on the pilgrimage in addition to the Mahmal escort and staff, which were 169 in number.

All pilgrims were vaccinated against cholera by the Mahmal medical officer.

No visit was made to Medina owing to the fact that it was still in Turkish hands.

In view of the occurrence of two cases of plague on board a ship coming from Jeddah, the Quarantine Board declared the pilgrimage infected, and consequently pilgrims were quarantined at Tor for a period of ten days.

The health of all pilgrims was good. On arrival at Suez only two were found unfit, one with influenza and the other with senility.

The result of observation was satisfactory, as all pilgrims (464 in number) were traced and observed with the exception of two.

THE PUBLIC HEALTH LABORATORIES.

Bacteriological Section.

Owing to the large number of specimens received for examination for cholera, incident upon the return of members of the Egyptian Labour Corps to their villages, it was found necessary to institute a special Cholera Service—two medical officers (4th class) being appointed. These medical officers took alternate day and night duty.

The number of examinations made for Government hospitals and Government services throughout the country shows an increase on last year's figure of 6,087, the increase being mainly under the headings of cholera, plague, malaria and relapsing fevers, enterica and influenza.

The examinations made for private practitioners have also slightly increased, the increase being

mainly under the headings of malaria and relapsing fevers and enterica.

The laboratories were constantly in touch with the different Government and military laboratories throughout the country, supplying them with such materials as were available. Media and standard cultures were issued when required, especially to the bacteriological car at Ismailia. The bacteriological car, which had been fitted out previous to the outbreak of war by this Department for special provincial work, is still utilized by the military authorities.

Samples of bread and flour were examined and reported on from time to time both for the military authorities and for Government Departments.

The laboratories were regularly consulted by the different Government Departments for advice and report on various specimens, such as disinfectants, filters, milk, &c.

Special researches were continued in connection with typhus fever (Weil-Felix agglutination tests and passage experiments), relapsing fever, paratyphoid A fever, &c., and the routine weekly examination of specimens for the Wassermann reaction was continued—the latter includes a weekly examination of new admissions to the lunatic asylum.

The daily analysis of milk on behalf of the Cairo City Health Inspectorate has been continued during 1918.

The following additional examinations of milk have been performed: Tinned milk, six; cream, one.

The number of analyses of water and ice made for all purposes during the year were as follows:—

Number of samples, 2,176; examined for total bacteria, 1,545; examined for lactose fermenters, 1,851.

REPORT ON THE INSPECTORATE OF PHARMACIES.

There were 371 pharmacies existing in the whole of Egypt at the end of the year, and 329 of them have been inspected. About two-thirds gave satisfaction from a legal point of view and by their general condition, and in the remainder certain irregularities were found. In the case of minor and first offences, the proprietors of the pharmacies were accorded a certain time in which to remedy the fault, but in cases where the offence was serious or repeated, *procès-verbaux* of contravention were drawn up against the offenders.

The shortage of pharmacists and assistant pharmacists mentioned in last year's report has become very acute. Only five pharmacists have been authorized and three assistants. This shortage will doubtless continue until communications between Egypt and other countries become normal. As a result of this shortage of pharmacists, certain doctors—proprietors of pharmacies—have been obliged to transform their pharmacies into simple drug stores and clinics and to prepare medicines for their own patients in their clinics. This transformation is only on the surface, and they usually

continue to prepare and sell medicines for outdoor clients, the dispensing being done by an unqualified person. Doctors' clinics being exempt from inspection, the Inspectorate is powerless to stop this proceeding.

The traffic in narcotic and stimulating drugs still continues on a large scale, not so much by pharmacists as by private persons, over whom the Inspectorate has no control. Twelve *procès-verbaux* have been drawn up against illegal traffickers in cocaine and morphine. Seven of these led to convictions, four were filed, and one resulted in acquittal. This abuse can only be remedied by the promulgation of a new law whereby the penalties will be such as to render the traffic both dangerous and unprofitable.

The illegal trade in opium has given rise to thirty-two *procès-verbaux*, which resulted in twenty convictions, seven filed and/or acquitted, and five pending.

The proportion of pharmacies owned by unqualified persons still remains very high, being 47 per cent. of the total. This is regrettable, as experience shows that, as a rule, pharmacies owned

by unqualified persons are administered very irregularly. The proprietors, being ignorant of the law, often order their managers to commit offences against it, and the manager is obliged to risk a contravention or else lose his position.

Early in the year it was discovered that certain consignments of Epsom salts which were coming into the country contained a proportion of arsenic far superior to that allowed by the British Pharmacopœia. Samples were taken, therefore, from all quantities arriving at the Customs and also from stocks existing in the country. Out of 4,490 samples analysed, 2,527 proved to be unfit for medicinal use. Stocks existing in the country were confiscated and destroyed, and import was refused to all consignments which did not fulfil the necessary conditions.

Fifty-seven samples of medicines have been purchased from various pharmacies during inspection. On analysis twenty-three were found to be genuine and thirty-four proved to be under strength, adulterated or of bad quality. This resulted in fourteen convictions, two acquittals, and three pending.

Colonial Medical Reports.—No. 127.—Ceylon.

MEDICAL REPORT FOR THE YEAR 1919

OF THE PRINCIPAL CIVIL MEDICAL OFFICER AND INSPECTOR-GENERAL OF HOSPITALS.

THE estimated population of Ceylon on December 31, 1919, inclusive of immigrant coolies (but exclusive of military and shipping), was 4,757,596 (of these, 7,349 were Europeans). This total is an increase of 71,233 on the previous year's estimate of population.

Vital Statistics.—161,403 births were registered, which is equivalent to 33.8 per 1,000 of the population per annum, as compared with 183,384 in the previous year, showing a decrease of 21,981. The deaths registered in 1919 totalled 168,323 as compared with 149,407 (an increase of 18,916 over the previous year), which is equivalent to 35.3 per 1,000. The total number of persons treated in the hospitals in 1919 was 133,195, of whom 12,637 died. The numbers for 1918 were 105,450 patients, with a mortality of 9,827. At dispensaries 1,499,891 persons were treated, who paid 2,254,162 visits in 1919, as against 1,203,063 persons, who paid 1,833,462 visits in 1918.

Deaths due to preventable diseases, i.e., to diseases due to faulty sanitary conditions, overcrowding, soil infection, defective or infected water supplies, &c., amounted to 11,705. This figure does not include infantile diarrhoea or infantile convulsions, though it is probable that a large number of deaths from infantile convulsions are due to malarial in-

fection, and a large number of cases from infantile diarrhoea to improper dieting, defective sanitary surroundings, and neglect.

Infantile Mortality.—The infantile mortality in the thirty-three principal towns during the year was at the rate of 259 per 1,000.

Vital Statistics on Estates.—The mean birth-rate on estates was 43.0 per 1,000, and the death-rate 58.5.

Influenza continued to prevail throughout the greater part of the island in 1919, though the incidence of the disease was not so widespread, and the type of the disease was fortunately much less dangerous. As regards the hospital returns, the admissions were almost as numerous as in 1918, but the death-rate was less than one-third of that year. There were two periods of greatest prevalence in most parts of the island, viz., May-June and November-December.

There was a great rise of admissions in the Western Province; in fact, all Provinces, except the Western, Eastern, and Sabaragamuwa, show a fall in hospital admissions. Public and private benevolence in the way of the supply of food and medical comforts and personal aid to the sick did much to mitigate the sufferings of the poorer classes in the larger towns.

Colonial Medical Reports.—No. 127.—Ceylon (continued).

Malaria was more prevalent in 1919, and was the cause of much sickness, and directly and indirectly of considerable mortality.

The widespread prevalence of this disease seems to call for more determined efforts of control. The extension and reorganization of the Sanitary Department and the proposed establishment of a Research Institute will, it is hoped, lead to the adoption on a great scale of the measures which in other parts of the world have been proved to be capable of materially lessening the incidence of the disease. The problem of malaria control is a complicated one, and requires much consideration to get the best results from the expenditure necessarily entailed. Quinine to the value of Rs. 307,008.28 was distributed free for preventive and curative purposes.

Plague.—The total number of cases reported was eighty-nine, with eighty-three deaths. Of these, eighty-two cases arose in Colombo, six were detected on ships arriving at the port, and one was a case in the Northern Province of a passenger arriving from India. The cases in Colombo were practically confined to the infected area near the harbour, where the disease has been endemic for some years past.

Cholera.—After some years of comparative freedom from cholera, unfortunately an outbreak of this disease occurred in two areas. The outbreak first occurred in July, and continued to prevail until September. A second localized outbreak occurred in November; there were twenty-six cases, with six deaths. One fatal case occurred on an estate in a newly arrived coolie from India. Ten cases were treated at the Infectious Diseases Hospital, Colombo, all being ship-imported cases, except one. The first outbreak was possibly due to the importation of the disease from India by some member of a travelling circus. The localized outbreak at Yokanda was traced to a cultivator who had passed through Buttala, then an infected area. When an outbreak occurs in a district, control is very difficult owing to the tendency of the inhabitants of infected villages to bolt to neighbouring villages. Adequate treatment in out-of-the-way places, some very difficult of access, is not readily carried out, and the mortality is necessarily high. The explosive outbreak at Meegahakiula was due to the public water supply becoming infected; the other cases were due to contact infection.

Small-pox.—Only some thirty-five cases in all were treated in 1919, and of these nine were ship-imported cases. Apart from the ship-imported cases, all the others were due to infection from recent arrivals from India. There was little or no spread of the disease.

Vaccination.—The total number of primary vaccinations performed was 128,795. Of these, 119,050 were successful. The percentage of successful primary vaccinations was 98.36.

Government Vaccine Establishment.—Seed lymph for vaccinating the calves was obtained

from the Lister Institute of Preventive Medicine, London, and also from the King's Institute, Madras. A certain amount was also locally prepared. A large quantity of lymph was stored in bulk as a reserve.

Enteric Fever.—This disease was more prevalent and more fatal in 1919. The real prevalence of this disease in the island cannot be judged from figures, as many cases are neither recognized nor reported as such. The incidence of the disease was apparently much more marked in the latter half of the year, especially in the Western Province.

Dysentery.—A considerable increase is shown as regards hospital admissions in 1919. The increased prevalence of this disease was probably associated with the excessive rainfall this year, leading to pollution of wells and other sources of water supply.

Leprosy.—Of the 117 admissions, ninety-five were new cases, and they were classified as under as regards the type of the disease: Tubercular, 11; anæsthetic, 44; mixed, 40.

Twenty-three were returned as "discharged"; of these, eighteen absconded, one was discharged as not suffering from leprosy, three Malabars were repatriated, and one was on leave. Of the eighteen absconders, five were arrested and brought back, eight returned of their own accord, and five, including the one on leave, are still at large.

The Ankylostomiasis Campaign.—During 1919 ankylostomiasis campaigns were conducted in the Uva and Central Provinces, and were concluded in the Avissawella-Hanwella section. These operations covered an approximate area of 297 square miles, and embraced 228 estates, and about thirty bazaars, villages and towns. During the year 88,602 persons were treated, and 69,032 of those treated were cured.

It does not seem possible or feasible to include very remote estates in the regular campaign programme. Distances are great, and supervision not practicable. A probable solution of this difficulty would be for those estates to employ dispensers, have them trained in campaign methods, and arrange for them to conduct the campaigns. This plan has already been followed successfully on several estates, and about 100 dispensers have been trained in the work by the field directors.

Two important factors contributed towards delaying the work during the year. The first was the influenza epidemic, which persisted off and on throughout the year, but which reached its climax in July, making it necessary to suspend work entirely in the Dimbula area for that month, and causing the work in all areas to be carried on at a reduced rate for long periods of time. During the latter part of the year, however, large numbers of labourers were made available for treatment, and this, together with closely grouped estates, efficient drugs, and an experienced staff, accounts for the marked increase in the amount of work which was done. The second difficulty was the food scarcity, due to the shortage of rice and the consequent increase in price of all other food commodities.

Additional supplies of rice were made available by Government for estates where campaigns were in progress, thus making it possible to proceed with the regular estate campaigns. In villages, however, where the individual had to purchase his own rice, it was not possible to carry on the work systematically as before. As a result two treatments only were given to each person in villages in the latter part of the year, and in a large majority of instances specimens were not returned for re-examination, so that the number of reported cures is very small. The difficulty in the rice situation continued throughout the year.

Changes in Campaign Methods.—In view of the fact that campaign methods have been considerably modified since the work was inaugurated in Ceylon, it may be proper to mention here the changes which have occurred. No general preliminary microscopic examination is now made of estate labourers, as experiments have shown that approximately 100 per cent. of them are infected. The treatment is not so drastic as formerly; the preliminary purge has been omitted altogether, as has also the preliminary fasting; the vermifuge dose is smaller, but equally efficient; the duration of work on each estate is shorter, and the disturbance of the estate routine has been reduced to a minimum; the staff is more experienced, and a much larger number can be treated daily. Not more than four series of treatments are given on estates, as it has been shown experimentally that the first two treatments should remove about 95 per cent. of the worms from each individual, and that it requires from two to six additional treatments to remove the remaining 5 per cent. Since a small percentage of infected persons are not treated for various medical reasons, it is thought that these lightly infected uncured cases will not increase the amount of re-infection. In fact, it is presumed that the latrines, if properly used, will take care of these cases.

Post-campaign Work.—During the year post-campaign measures were conducted in the Matale District. Thirty-eight estates were reached, and 3,686 labourers were treated. In addition, 563 villagers came voluntarily for treatment. The re-infection percentage remains high, however, varying between 40 per cent. and 91 per cent. Soil pollution is still in evidence on many estates in this district, and this accounts in part for the higher infection rate. The nature of the crops grown, the elevation, and climate are also factors to be considered. It might be advisable to state here that in the villages embraced in the Matale area 3,741 latrines were constructed during the year. It is significant of increasing interest to learn that in two of the districts where regular campaigns were conducted in 1919 post-campaign work has been asked for.

Sanitation.—Before undertaking a campaign, arrangements were made by Government for one of its inspecting medical officers to visit the estates in the district and advise superintendents how to prepare for the campaigns, so that the greatest benefit could be derived therefrom. Unfortunately

the number of officers available for this important work was very limited, and not all estates were visited.

It is the consensus of opinion among the field directors who visit the estates daily during the year that progress in the improvement of sanitary conditions of lines and latrines on estates has been made, especially in comparison with the situation when anti-ankylostomiasis operations began in 1916. All agree that upon the whole the latrine provision is adequate, but, on the other hand, say that many of the latrines are unused or improperly used, and in some instances have deteriorated to such an extent that they are not usable. It appears, therefore, that much additional work can be done advantageously in this respect. It is a noticeable fact that on estates where the superintendents are keen on sanitation, the paths and line surroundings are not polluted, and that the latrines are properly used. It has to be noted also that coolies on well-sanitated estates are healthier, that they are cured of ankylostomiasis more quickly, that the re-infection percentage is lower, and that the mortality from prevailing epidemics was very much less.

In villages where ankylostomiasis work was undertaken, an increased number of latrines was built and sanitary conditions generally improved. Prior to beginning work an inspector was furnished by Government, who lectured to the people, and visited them and instructed them in the building, maintenance, and use of latrines. In this connection it might be well to note the present situation in Porto Rico, where treatments for ankylostomiasis were given about fifteen years ago by Government officers especially delegated for the work. A staff member of the International Health Board, who has just returned from a visit to Porto Rico, writes: "The experience in Porto Rico again makes concrete proof that our policy is sound in not encouraging hookworm measures, unless soil sanitation has been carried out at least six months in advance, and unless arrangements have been made by Government for maintenance and inspection to see that latrines are properly used. Although Porto Rico has a population of approximately one million, and has already spent \$347,000 on hookworm control, we found an infection rate of over 90 per cent. in 2,000 examinations at various test points among the rural population. Fully 80 per cent. of the houses have no latrines. The trouble is that all the money was spent on relief measures, and very little effective sanitation was accomplished."

It is undoubtedly true that a long stride in the right direction was taken in sanitary matters in Ceylon by the erection of latrines on estates and in villages. If the ground gained thereby is not to be lost, it is necessary that these latrines, which were built at considerable cost, should be used in a proper manner. It is probable that an increased number of competent inspectors, who will act in an advisory capacity and enforce regulations, might furnish a means for meeting the situation.

Parangi (Frambæsia, or Yaws).—As in 1918 and 1917, over 5,000 cases were treated in Government hospitals and dispensaries. Of the 5,270 cases treated in 1919, some twenty-three died.

Tubercular Disease of the Lungs (Pulmonary Phthisis).—The number of these cases under treatment in the various Government hospitals during 1919 was 2,656 with 801 deaths.

Incidentally it may be mentioned that tubercular disease of joints, bones and glands, which is so prevalent amongst children in temperate climates, is comparatively rare in Ceylon, as in other tropical and sub-tropical countries. This lends strong support to the view that this form of the disease is largely due to infection from the milk of tubercular cows, for this disease (tuberculosis) is very rare in cattle in tropical countries.

Apart from the treatment of cases of phthisis in various general hospitals, three separate institutions are specially provided for dealing with this scourge, viz., the Anti-Tuberculosis Institute in Colombo, a sanatorium for early cases at Kandana some seven miles out of town, and a hospital for chronic cases at Ragama, some eleven miles away. At the dispensary in Colombo the cases are recognized, and suitable early cases sent to Kandana and chronic cases sent to Ragama.

The number of Colombo cases registered as phthisis was 593. No fewer than 278 deaths occurred from phthisis in Colombo not certified as such by a qualified medical man. Over 1,000 cases of deaths from phthisis occurred in Ceylon in 1919, and the number of people suffering from this disease in the island must be over 10,000.

Port Health Precautions, Colombo.—In 1919 a total of 2,791 British and foreign steamers and 316 native sailing craft called at this port and were duly inspected. Of these, thirty-one were placed in strict quarantine. Eighteen were dealt with on account of small-pox, six on account of plague, and four on account of cholera, and one on account of cerebrospinal meningitis.

Disinfection and Vaccination.—The following numbers were dealt with at the disinfecting station on the Breakwater: (a) Disinfection: Passengers, 45,971; cargo coolies, 47,946; coal coolies, 43,802; and tally clerks, 2,999. (b) Vaccination, twenty-five persons. Cargo lighters were regularly fumigated, and rat destruction systematically carried out. Several ships were disinfected before being docked. The tanks of water boats were periodically cleaned and disinfected.

METEOROLOGICAL CONDITIONS.

Rainfall.—For the island generally the rainfall for the year was above the average, being especially so south-west of the hills and in the Northern Province. It was in deficit, however, at most places on the east side of the island, to a somewhat less extent in the south and in the Matale District. The largest fall recorded for the year was in the

Nawalapitiya District. Here, at Strathellie estate, altitude 2,500 ft., rain falling on 251 days totalled 239.43 in. The least rainfall was experienced in the east at Naula, near Arugam Bay, which had a total for the year of 24.56 in. in sixty days. The longest drought occurred at Elephant Pass and lasted for 117 days, May 15 to September 8. Thunderstorms were, on the whole, more numerous, being possibly due to the greater heat of the early months of the year; but the consequent precipitation was less than is usually experienced.

Temperature.—During January and February the mean shade temperature was decidedly higher than usual, and being immediately followed by months in which the temperature is normally high in the more populous parts of the island, this had the effect of prolonging the hot season, and thereby making it more trying. For the remainder of the year the temperature was about normal, which resulted in the mean for the year being, on the whole, but slightly above the average.

Wind.—To the extreme north and south the wind strength was above normal, being especially high in March and August and high in the remaining months, except November and December, when it was about normal.

SANITARY BRANCH OF THE MEDICAL DEPARTMENT.

Infectious Diseases.—The following infectious diseases were reported and prophylaxis carried out: Enteric fever, 245; dysentery, 234; chicken-pox, 381; measles, 34; small-pox, 1.

Only one case of cholera occurred in Colombo District in the person of a Tamil employed at the Kolonnawa Oil Installation Works.

Cholera Epidemic at Hambantota.—This occurred in July at Hambantota and neighbouring villages. The origin of the outbreak was traced to one of the employees of a travelling circus which had recently come from India. This epidemic was finally got under control and the area declared free from cholera in August, 1919. The total number of cases, 447; deaths, 348.

Epidemic at Tissamaharama.—This outbreak occurred during November, the origin of which was traced to a Moorish cultivator from Batticaloa, who passed through Buttala, then a cholera-infected area, on his way to Tissamaharama. Total number of cases, 26, with 20 deaths.

Sporadic cases of influenza prevailed throughout the island, and prophylactic measures in the shape of advice, distribution of disinfectants, food, and pecuniary help were rendered by the sanitary inspectors in co-operation with the local police headmen.

Hookworm Disease.—At the request of the Medical Officer of Health, Colombo, 1,284 specimens of excrement from the pupils of the various colleges and the residents within municipal limits were microscopically examined for hookworm infection, of which 575 were found positive.

Colonial Medical Reports.—No. 128.—Bahamas.

REPORT OF THE MEDICAL DEPARTMENT FOR THE YEAR ENDED MARCH 31, 1920.

By **A. H. B. PEARCE,***Chief Medical Officer.*

OFFICE OF THE CHIEF MEDICAL OFFICER,

Nassau, New Providence, Bahamas.

Vaccination returns for six months ending December 31, 1919.—Number successful, 941; number unsuccessful, 46.

The above shows the vaccination returns for six months ending December 31, 1919. I am convinced that the number successful is abnormal, as it is impossible to obtain such persistent success, especially when one considers the distance from which the lymph is imported. I consider the inhabitants of this Colony very imperfectly protected against small-pox, especially on the Out Islands. As long as vaccination is entrusted to laymen such a state of affairs is bound to exist. The frequent intercourse and communications with Florida naturally exposes the Colony more to an epidemic of small-pox, and with a half-vaccinated population the results are too dreadful to contemplate.

There is only one qualified medical practitioner stationed in the Out Islands, and, with the exception of this station, when any of the inhabitants of the islands become ill they have to visit Nassau, if able to travel. This I consider a great and unnecessary hardship. During the severe epidemic of influenza through which the Colony has just passed the Out Islanders must have suffered and died from lack of medical attention. With the daily communication between Bimini and Miami and the Out Islands in general, I feel certain this Colony will be visited by more severe epidemics than it has ever experienced in the past. With all this frequent intercourse we are bound to suffer from the same epidemics as Florida.

THE INFLUENZA EPIDEMIC.

The Colony has been visited by two epidemics of influenza, one in November and the other in February. These epidemics were undoubtedly introduced from the States, and we shall be unable to prevent a recurrence of such a widespread epidemic as long as there is such frequent communication with Miami, and the Out Islands have no qualified medical officers to enforce the quarantine laws. In the November outbreak the symptoms were, for the most part, mild; general malaise pains, and the temperature rarely rising above 102° F., and defervescence at the end of three or four days, leaving little of that lassitude and depression which was such a predominant feature of the subsequent outbreak. The February

epidemic was of a much more formidable type, the outstanding feature being the frequency and severity of the pulmonary complications. The death-rate was much higher, but there is no medical registration of deaths in the Colony.

Venereal disease is, without doubt, one of the most knotty problems that this Colony has to face. So widespread are the ravages of venereal disease in the Bahamas that I am afraid the wage-earning capacity of the labouring classes is likely to be seriously impaired, unless very strong and rigid legislation is enforced. His Excellency Sir William Allardyce, K.C.M.G., late Governor, became very soon alive, after his advent to the Colony, to the seriousness of the situation, and in 1918 appointed a Venereal Commission.

The findings of the Commission have been printed in an extremely comprehensive and concise report. There will shortly be before the House of Legislature a Venereal Bill, framed on the recommendations of the Commission. I have had the privilege of perusing a draft of this ordinance. It appears, however, in its present form, to be deficient in one of the most important recommendations made by the Venereal Commission, namely, the appointment to the medical service of the Colony of an expert bacteriologist, who has been accustomed to perform blood tests and venereal bacteriology. The services of such an officer, apart from venereal disease, would be of immense benefit to the Colony. The diagnosis of all fevers and infective diseases is entirely clinical, as there is no means of confirming the diagnosis. Typhoid is diagnostic as typhoid pure and simple by the clinical symptoms; whether a case is typhoid, or paratyphoid A or paratyphoid B is not known, and similarly with the other infective diseases. There is one Government microscope in the Colony, but it is antiquated in type and defective from want of use. In the event of an epidemic of sore throats occurring, it appears to me a very serious state of affairs, when one considers that Nassau is a popular health resort, and there is at present no officer, appliances, &c., for determining whether or not diphtheria or any other fever is epidemic in the Colony.

PUBLIC HEALTH AND SANITATION.

With the exception of the two epidemics of influenza the health of the Colony has not been below the average of previous years. There have been sporadic cases of measles, German measles, mumps and chicken-pox, but the number of cases has not been sufficient to constitute an epidemic.

Colonial Medical Reports.—No. 128.—Bahamas (continued).

Every year, especially during the summer months, sporadic cases of typhoid continue to crop up, especially in Nassau. As I have already pointed out, there is no means of verifying the type of this disease. From the cases I have seen they appear to be clinically more of the paratyphoid group than pure typhoid. The cesspit system is the usual method of disposal of sewage in Nassau. Since the 1914 Health Act came into force strict supervision is now imposed upon persons desirous of installing a water toilet system or sinking a cesspit. Before such work can be commenced the permission of the Board of Health has to be obtained, and it must be under the supervision of the sanitary inspector. Hermetically sealed Cameron septic tanks with several compartments are what the Board of Health allow, and several drainage systems on this principle have been introduced since my arrival in the Colony. The hilly formation of the city of Nassau is eminently suited for the installation of a modern sewage system, and until this is done the sanitation of Nassau will not be satisfactory. The sanitary inspector, Mr. A. Sweeting, has performed his somewhat unpleasant duties in a conscientious and painstaking manner. I personally inspected with him the dairies, aerated water factories, bakeries and dust heaps. They were all fairly satisfactory, and several improvements recommended have been carried out.

THE MARKET.

Taken on the whole the general condition of the market is satisfactory and quite up to the average standard, excepting one or two important details to remedy which recommendations have already been made.

SLAUGHTER-HOUSE.

I sent a lengthy report on this subject last year, and the Honourable House of Assembly have voted the sum of £4,000 for the erection of a modern abattoir.

BAHAMAS GENERAL HOSPITAL.

This institution has for some years past been subject to a good deal of adverse criticism from the public. From my close association with the hospital during the past year, both as Chairman of the Board of Commissioners and Chief Medical Officer, I am afraid that such criticism is not unwarranted. As far as cleanliness of the wards and the nursing staff are concerned, I do not consider it below the average of a West Indian hospital. The medical and surgical work reflect great credit on the resident surgeon, who has had to work under most trying conditions. What is called the operating theatre is merely an ordinary room without any of the modern requirements in structure and appliances that constitute all that is essential for the performance of up-to-date major aseptic surgery. It is with great reluctance that one performs any major abdominal operations in such a building, where all cases, septic and aseptic, have to be treated. The Red Cross have granted this Colony the sum of £500, which it has been decided to

utilize in the building of a new operating theatre and an X-ray room, both of which will, undoubtedly, be of great benefit to the Colony. The surgical instruments were worn out and in many cases unfit for use. On these instruments I recently appointed a Medical Board of Survey, and on their recommendations have ordered a new supply. These, with the proposed new theatre, ought to make surgical work much more satisfactory.

The sanitation of the Bahamas General Hospital has been adversely reported on by every medical officer who has inspected it. I do not propose here to go into any descriptive details on this subject, as my predecessor has fully dealt with it in his comprehensive report on the institution, and I have already communicated to the Government my views on the Bahamas General Hospital and made certain recommendations. I expect to be able to state in my next annual report that a modern sanitary system has been installed.

Out-patient department is an exceedingly expensive department, and in my opinion should be abolished. Patients attend there four days a week, and one has only to look at the returns given in the resident surgeon's report to see how immensely popular it is. I would recommend the abolition of this department, except for accident and emergency cases, and instead the visitation of the colonial surgeon to the police stations at Fox Hill and Grant's Town on stated days, when he could see the sick of these districts. I feel convinced there is a great deal of hospital abuse in this Colony, and that many patients receive free medicine and treatment who could well afford to pay a private doctor. One has only to visit the out-patient department and see the well-dressed applicants for free treatment driving up in rubber-tyred carriages to realize this. The authority to grant tickets for free treatment is given to too many people.

Outdoor relief is another most expensive item, and I feel convinced that instead of issuing rations indiscriminately to the poor much better results would be obtained if money in lieu of rations were issued. This is now generally being done in the West Indies, and apart from the financial saving to the Colony, the people are more satisfied, as they find they can do more with the money than with so many pounds of grits and sugar. The Bahamas General Hospital supplies medicines to the prison, police and Out Islands, as well as poor relief to the Out Islands, a fact that I do not think is quite realized by the public.

VITAL STATISTICS.

Births during the year 1919	...	...	2,001
Deaths during the year 1919	...	...	1,002
Number of inhabitants in 1919	...	...	60,048
Emigration	...	5,477	
Immigration	...	2,234	
			3,243
Estimated population	...	...	56,805
Decrease in population	...	...	2,244

BAHAMAS GENERAL HOSPITAL,

Nassau, N.P.,

March 29, 1920.

The cases under treatment during the year call for no special comment.

During the later months of the year there was an epidemic of influenza which, in part, accounted for the unusually large number of deaths in the institution.

In explanation of the high death-rate, it may be pointed out that in many cases patients are brought into the institution in the last stages of their illness when treatment is hopeless, and indeed in some cases the patient is moribund.

J. J. CULMER,
Resident Surgeon.

REPORT OF THE COLONIAL SURGEON FOR THE TWELVE MONTHS ENDING MARCH 31, 1920.

All patients too ill to attend the hospital out-patients' department have been attended to at their homes as part of my duties.

These cases number 263, on whom visits to the number of 517 have been paid.

The diseases most prevalent have been, as in other years, gastro-intestinal, pulmonary, venereal and malarial, but in my opinion these diseases have been this year more resistant to treatment on account of the lowered vitality of the poorer classes caused by insufficient food of the proper quality.

Low earning power, with food at almost prohibitive prices, together with very small field crops on the whole, have been the causes that together worked against the quick recovery of the poorer people, even when suffering from diseases that would in other years be considered trivial.

The Colony has been visited with two epidemics of influenza; the first during the months of October and November, 1919; the second during the months of January and February of this year.

The types of the two epidemics were very similar, but in the second epidemic I saw a greater number of cases running on to pneumonia than came to my notice during the former epidemic of last autumn. Recovery was the rule, but frequently there were left neuroses, and in several cases myositis that took weeks to recover from.

In the treatment of these poor people I have drawn on the hospital pretty freely for such articles as milk and cornstarch or arrowroot, and in several cases this food supplied has been the only nourishment available on account of their extreme poverty.

POLICE DEPARTMENT.

During the year members of the force reported sick 112 times.

A little over a year ago prophylactic treatment for venereal diseases was made obligatory. The result is that during the past year three venereal cases were treated as compared with ten the year before.

The shower bath has been well patronized, and it has been a good thing for the men.

The latrines are kept cleaned regularly and very little fault could be found.

MEDICAL REPORT ON PRISON.

With the exception of Sundays and Public Holidays sick parade for the prisoners has been held each morning about seven o'clock.

The health of the prisoners has on the whole been good, though many of them are in very poor condition physically when they come in. The general rule is for them to put on weight after they have been there a few weeks unless they are suffering from nervous disease.

The prevalent diseases are gastro-intestinal, pulmonary and venereal.

Influenza was prevalent in the prison during two epidemics.

Eighteen inspections have been made by me during the past year.

I have usually found everything clean and as it should be. If attention has had to be drawn to anything that might be changed for the better, the change has been made promptly and cheerfully, and there has been no need to draw attention to the same thing a second time.

Each day a sample of the bread is placed on my table in the prison, which is sampled by me, and an entry made in the sick register on the date. The quality of the bread is consistently high, and I gladly commend the baker for the care taken to keep it up to the high standard.

H. MATHER HARE, M.D.,
Colonial Surgeon.

BAHAMAS GENERAL HOSPITAL,

Nassau, N.P., Bahamas.

May 11, 1920.

The year under review has been one of arduous and unrelenting toil, from early to late hours of the day, trying to cope with overwhelming prices of the common necessities of foodstuffs and clothing (these prices are too well known to all).

The greatest effort for the economical handling of the funds as provided for by the vote have been in many instances baffled by the exigencies of the situation.

In considering the financial situation, the high rate of exchange forms a large portion of the excess of the vote.

The greatest difficulty has been experienced in obtaining the services of efficient help, owing to alluring prices for similar work in Miami.

The sanitary situation is still in a deplorable condition, and until a water and a toilet system are installed the present unsatisfactory state of affairs will remain.

The demand for outdoor relief is ever increasing, and will ever do so until some means is devised by which the youth of the country is not allowed to participate in the receipt of pauper food, for the idea grows with them that at old age the Govern-

ment will have to provide for them, and a system of free distribution of food tends to prodigality.

The Government has under consideration the inspection of deaths from the outside by a medical man, and also means of preventing young people, especially girls, of leaving their homes from the Out Islands for the city, who in time fall a prey to the ravages of immoral living, and finally become a charge on the institution either as a pauper or a patient of the venereal type.

The Out Island paupers, who now number 255, should be very few. Only the cripple and blind should come under this class, for it appears to me the poor of these islands may be provided with such work to which they could adapt themselves, such as the privilege of access to patches of sisal along the public highways, which can be brought on to a mature condition by yearly grants for weeding country roads. This experiment was proved without a doubt by me as Commissioner of Exuma.

No decrease in number of patients may be expected when no attention is paid to hygiene in their homes, before or after their stay in the hospital.

The financial statement for the year is attached.

I have the honour to be, Sirs,

Your obedient servant,

STANLEY V. S. ALBURY,

Superintendent.

FINANCIAL STATEMENT FOR YEAR ENDING MARCH, 1920.

Item	Receipts			Expenditure		
	£	s.	d.	£	s.	d.
(1) Fuel	—	—	—	234	10	8
(2) Maintenance	100	12	9	4,734	16	6
(3) Medical and Surgical	20	7	10	1,031	3	7
(4) Passage of paupers	—	—	—	55	9	5
(5) Salaries	—	—	—	1,273	17	3
(6) Upkeep of grounds	—	—	—	156	3	10
(7) Bedding and clothing	189	1	2	735	11	7
(8) Freight	—	—	—	42	5	1
(9) Drayage	—	—	6	12	13	3
(10) Cab hire	—	—	—	21	18	9
(11) Out island drafts	—	—	—	139	5	0
(12) General repairs	—	3	3	508	16	5
(13) Insurance	—	—	—	54	6	7
(14) Lighting	—	—	—	138	5	0
(15) Funeral expenses	3	0	0	552	16	0
(16) Apprentice's salary	—	—	—	71	12	8
(17) Paying patients	263	16	0	263	16	0
(18) Out-door services of nurse	50	6	6	50	6	6
(19) Printing	—	—	—	32	0	10
(20) Unforeseen and contingent	—	—	—	240	5	6
(21) Peace dinner	25	0	0	24	7	8
(22) Exchange	—	—	—	320	17	4
Gratuities	—	—	—	10	0	0
Arrears of salary, 1918	—	—	—	6	7	1
Treasury vote	8,000	0	0	—	—	—
Treasury advance	1,000	0	0	—	—	—
Sewer pipe	180	0	0	—	—	—
	9,832	8	5	10,712	12	6
Balance	880	4	1	—	—	—
Total amount	10,712	12	6	10,712	12	6
Vote of indemnity—£2,060	4s.	1d.				

Colonial Medical Reports.—No. 129.—Hong-Kong.

MEDICAL AND SANITARY REPORTS FOR THE YEAR 1919.

SANITARY DEPARTMENT.

THE most noteworthy infectious disease was an outbreak of a disease with choleraic symptoms. Where the cholera vibrio or its reactions were found the disease was recorded as cholera, and when the signs were insufficient to establish positively the disease as cholera the affection was called gastro-enteritis. The question of the specific entity of the disease did not much concern this department, as all cases were treated as if they had been cholera and disinfected accordingly. The number of deaths registered from gastro-enteritis were 339 and forty-six from cholera.

The other diseases notified during the year were: Cerebrospinal meningitis, 269; plague, 464; enteric fever, 133; small-pox, 27; diphtheria, 50; puerperal fever, 12; paratyphoid fever, 3; and scarlet fever, 7.

REPORT OF THE PRINCIPAL CIVIL MEDICAL OFFICER AND THE MEDICAL OFFICER OF HEALTH.

GENERAL SANITARY CONDITIONS.

The demand for housing accommodation which has been a noticeable feature since 1912 still con-

tinues, and building obviously does not keep pace with the increase of population.

There is certainly much surface crowding, but to what extent it is not possible to say.

The population estimated to the middle of 1919 was as follows:—

Non-Chinese Civil population	13,600
Total Chinese population	584,500
Total civil population	598,100

The last census was taken in 1911, and there has therefore been difficulty in estimating the population of the Colony during the last few years.

The births registered during the year were as follows:—

	Male	Female	Total
Chinese	1,298	602	1,900
Non-Chinese	164	130	294
Total 1919	1,462	732	2,194

Chinese deaths numbered 11,348, which gives a death-rate for Chinese of 23·3 per 1,000 as against 24·5 in 1918 and 23·7 in 1917.

DISEASES.

Enteric Fever.—As usual the disease has not been of the nature of a water-borne or milk-borne epidemic. The manner of acquiring infection is probably due in this Colony to (i) the eating of uncooked vegetable, e.g., in salads, (ii) the eating of shell-fish, and (iii) the contamination of food by flies which convey infective material from uncovered latrine buckets.

The number of "carriers" of the disease among the Chinese is probably considerable.

The substitution of water-flushed privies, both for public and private use, which is gradually taking place in the Colony, will greatly lessen the chances of infection through flies.

Cholera.—An epidemic of gastro-enteritis occurred, during the year, of choleraic type, and while definite bacteriological evidence of those cases being cholera was wanting, they were regarded as being cholera, and steps for disinfection, &c., were taken accordingly. There were 339 deaths ascribed to the disease.

REPORT BY COLONIAL VETERINARY SURGEON.

DISEASE IN DEPOTS.

Rinderpest.—A few cases continued to arrive practically throughout the whole of the year. The type of the disease was mild. Wu Chow was said to be the centre from which the disease came, but the actual place of origin is uncertain, as Chinese dealers are by no means reliable as to information they give, and Wu Chow simply means the port of embarkation. In all forty-five cases were diagnosed.

In November a disease very much resembling foot-and-mouth appeared, but it lacked the very actively infectious character of foot-and-mouth disease, and soon disappeared spontaneously. It was apparently a vesicular stomatitis which disappeared when the causal agent, which was undiscovered, ceased to act.

Five cases of anthrax were found against seven in 1918. These all occurred in cattle said to have come from Wu Chow.

Fourteen cases of tuberculosis were found in dairy cattle sent in for slaughter. As usual native cattle did not furnish a single case.

GRASS SUPPLY FOR GOVERNMENT BULLOCKS.

The area under cultivation remains the same as last year. The total grass cut at Kennedy Town was 224 tons 2 cwt. A considerable amount of this was supplied to the Medical Department to feed ponies used for the preparation of anti-meningococcal serum, and for this no charge was made.

RABIES.

Importation of dogs from Shanghai and Chinese ports north of Shanghai was prohibited until further notice.

Dogs remained unmuzzled. A total of sixteen dogs was detained under observation *re* rabies. Of these two proved to be suffering from rabies, seven were destroyed as having been in contact with a dog suffering from rabies, and the remainder were returned to their owners.

VICTORIA GAOL.

REPORT BY MEDICAL OFFICER.

The health of the prisoners was satisfactory in the latter part of the year, when an unsatisfactory rice supply and overcrowding prevailed. The first of these conditions has now been remedied and the second one will be shortly.

Nine deaths from disease took place. The causes were as follows: Pneumonia, 4; heart disease, 4; enteric fever, 1. This is the average for the last ten years. Seventeen prisoners were liberated for medical reasons: Heart disease, 7; pulmonary tuberculosis, 6; renal disease, 2; beriberi, 2.

During the last week in October an outbreak of beriberi occurred amongst the prisoners, and is continuing at the end of the year; the number of cases to the end of the year was 202, of whom 189 were treated in hospital and thirteen in the gaol.

Towards the end of July the unpolished rice given to the prisoners was changed to polished rice, owing to the impossibility of obtaining the former. Three months later an outbreak of beriberi supervened.

The outbreak presents no features in any way different from other gaol outbreaks already recorded, except that it was impossible to get unpolished rice, and dieting in other ways had to be used; and although this failed to stop the occurrence of the disease, the type was so mild that no death has so far occurred, and all the cases except those which occurred early in the epidemic have been of a mild type, but have proved rather resistant to treatment owing to the rice that they were receiving being of inferior quality. On December 30 the first consignment of unpolished rice was received, and I hope that some improvement will soon manifest itself.

The rice was sent to the analyst for examination, and he reported that there was only 0.24 of phosphorus as phosphorus pentoxide present—the minimum safe rice should contain is 0.35, and this is very low. The unpolished rice has been analysed and contains 0.50 per cent.

An attempt was made to give the prisoners rice bran which contains the necessary vitamins, but they objected to eating it, and the use of it had to be abandoned.

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